THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXXV. No. 879.] LONDON, MARCH 16, 1880. [32ND YEAR.] Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
BLACKWALL, E.;
OFFICES:
26, 27, & 28, FENCHURCH ST.,
LONDON, E.C.

GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
SEVERAL PRIZE MEDALS. ESTABLISHED OVER 20 YEARS.
These Paints are now used by all the London Gas Companies and most of the principal Country Gas Companies, on Gas-holders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
Supplied, mixed ready for use, or in paste, as desired.
TORBAY PAINT COMPANY.
PROPRIETORS: STEVENS & CO.,
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WORKS: BRIXHAM, TORBAY.

THOMAS PROUD,
BROOKFIELD GAS APPARATUS WORKS,
102, ICKNIELD STREET EAST, BIRMINGHAM.
CONTRACTOR FOR
LAYING MAINS
FOR
Gas, Water, & Sanitary Purposes,
AND MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS AND PURIFIERS.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE.
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and other OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
JOS. COWEN & CO. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL & CO.,
LIMITED,
Established at the commencement of Gas Lighting,
MANUFACTURERS OF
TUBES AND FITTINGS.
THREE PRIZE MEDALS,
Paris, 1878.
HEAD LONDON OFFICE:
145, QUEEN VICTORIA STREET.
ALMA TUBE-WORKS, WALSALL;
OLD PATENT TUBE-WORKS, WEDNESBURY.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
LICENSEES AND MANUFACTURERS OF
HUNT'S
PATENT COMPENSATING METERS
STREET-LAMPS, &c., &c.
ESTABLISHED 1830.

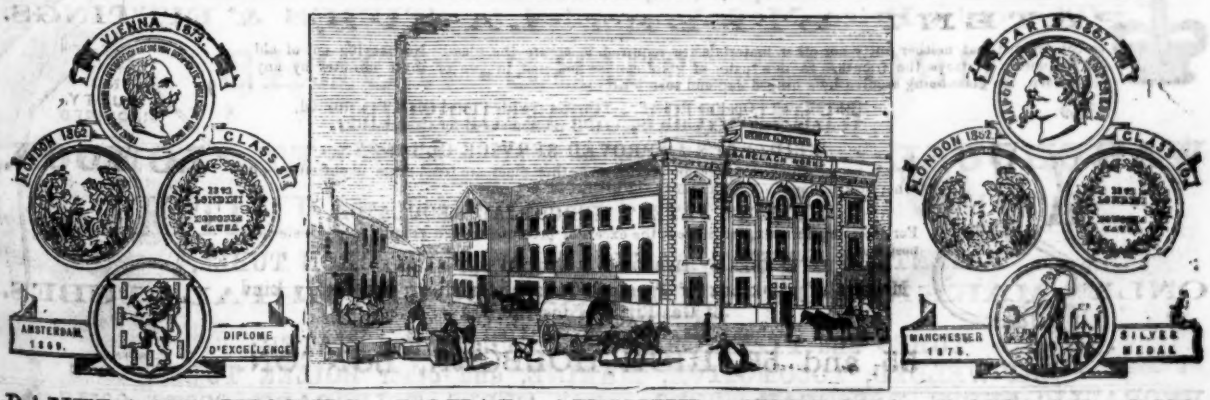
THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM,
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
London Offices: 97, CANNON STREET—
JAMES E. & SAMUEL SPENCER, Agents.

THE
"OTTO" GAS-ENGINE.
See Page 390.

CROSSLEY BROTHERS,
MANCHESTER AND LONDON.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.
ESTABLISHED 1840.

CHANGE OF ADDRESS.
GEORGE GLOVER AND CO.,
DRY GAS-METER MANUFACTURERS,
HAVE REMOVED TO MORE EXTENSIVE PREMISES:



RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.

WELLINGTON TUBE WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE.

JOSEPH AIRD,

GAS, STEAM, AND HYDRAULIC TUBES AND FITTINGS.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

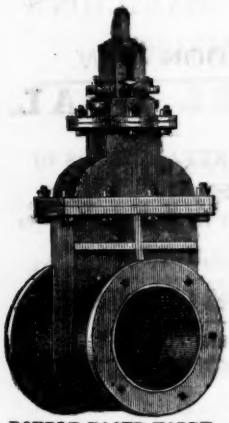
GAS APPARATUS;

CONTRACTORS FOR THE

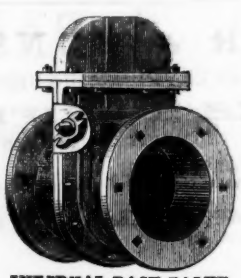
ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

C. & W. WALKERS' GAS-VALVES.

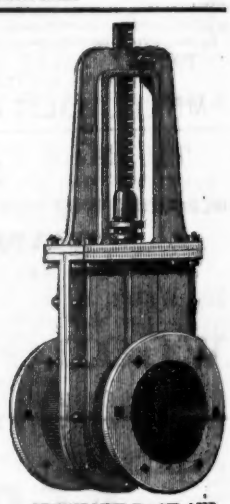


DOUBLE-FACED VALVE SPECIALLY FOR PURIFIERS.



INTERNAL RACK-VALVE WITH STEEL PINION, FOR GENERAL USE.

UNDERGROUND SCREW-VALVE FOR SHALLOW STREET-MAINS.



ORDINARY RACK AND PINION VALVE.

MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.,

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

LONDON OFFICES: 97, CANNON STREET—JAMES E. & SAMUEL SPENCER, AGENTS.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

SAMUEL CUTLER & SONS,

CONTRACTORS FOR GAS & WATER WORKS, GENERAL ENGINEERS, IRONFOUNDERS & MANUFACTURERS OF

GASHOLDERS, TANKS, PURIFIERS,

SCRUBBERS, VALVES, EXHAUSTERS, IRON ROOFS, BRIDGES, BOILERS, AND GENERAL CAST AND WROUGHT IRON WORKS.

S. C. & SONS undertake the entire erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the supplying and laying of MAINS.

They make a speciality of supplying every requisite whatever for Gas-Works, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.

SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

Manufacturers of MORRIS & CUTLER'S PATENT CONDENSER & CUTLER'S PATENT GAS-WASHER.

DESCRIPTION OF MORRIS & CUTLER'S PATENT CONDENSER.—The Condenser may consist of pipes arranged in tiers, or in any other form most convenient to the site available, each tier being connected with special connections, and containing within same either one or more coils of smaller pipe through which water is passed, being supplied from any convenient source of supply, the water passing in an opposite direction to the gas, so that the coldest water is at the gas outlet. The power of the Condenser can be regulated precisely in proportion to the quantity of water allowed to pass through, which is not in any way contaminated, but simply heated by the hot gas, and advantage can be taken of its being at a high level to carry it to a high-level cistern, from whence it can be used for supply to boiler or any other purpose. The Condenser itself may form the support for a high-level cistern. By an arrangement of valves the water may be shut off, and an air orifice opened, when air will pass through instead of water, or both air and water can be shut off. The power of the Condenser is, therefore, entirely under control. The Condenser may be seen in operation at the Brentford Gas-Works.

For further Particulars, apply to Mr. F. MORRIS, GAS-WORKS, BRENTFORD, or to S. CUTLER & SONS, PROVIDENCE WORKS, MILLWALL (Near the Steamboat Pier), LONDON, E.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER AND BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM (Established 1765),

MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST-IRON TANKS FOR DITTO.

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS.

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

AND ALL KINDS OF WROUGHT-IRON WORK.

Drawings, Specifications, and Estimates supplied on application.

GAS PURIFICATION

BY

OXIDE OF IRON.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

JOHN WM. O'NEILL, Managing Director.

GAS *v.* ELECTRIC LIGHT.

WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,

For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required.

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

SOLE MANUFACTURERS:

J. EDMUNDSON & CO., Gas Engineers, 19, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

HANNA, DONALD, & WILSON,

(ESTABLISHED 1851,)

GAS ENGINEERS & CONTRACTORS

FOR THE

ERECTION OF GAS AND WATER WORKS,

TELESCOPIC AND SINGLE-LIFT GASHOLDERS,

CAST AND WROUGHT IRON GASHOLDER-TANKS,

IMPROVED FIXED OR TRAVELLING HYDRAULIC PURIFIER-COVER LIFTERS,

PURIFIERS, CONDENSERS, SCRUBBERS, EXHAUSTERS, AND PUMPING-ENGINES,

TAR AND LIQUOR PUMPS, HYDRAULIC SLUICE AND SLIDE VALVES, LAMP-POSTS AND HYDRANTS COMBINED.

DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

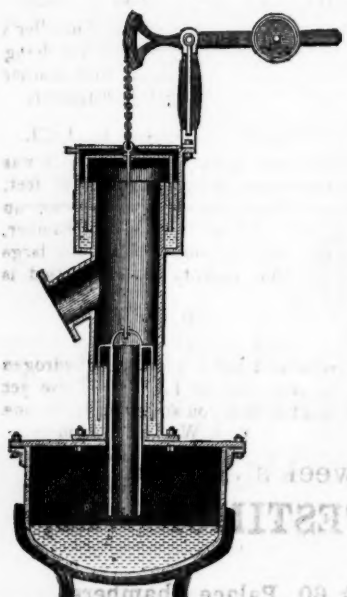
London Office: 9, FENCHURCH STREET, E.C.

ABERCORN FOUNDRY & ABBEY WORKS, PAISLEY, N.B.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



The following Testimonials, as to five years constant working of this Patent Removable Dip, have been received:—

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Jan. 15, 1874.

Messrs. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiries, I beg to inform you that since I have used your Patented Dips (ten in number), I find my make has increased over 1000 cubic feet per ton of coal carbonized, my usual make being 9070 cubic feet before using your Dips, and 10,150 cubic feet since using them.

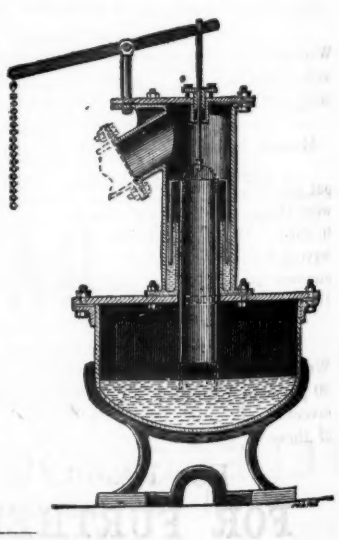
Metropolitan District Asylum Gas-Works, Caterham, Surrey, Dec. 30, 1879.

Messrs. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiry, it is with very much pleasure that I endorse every word of my letter of Jan. 15, 1874; and I may add that from the date the Patent Dips were fitted, they have worked perfectly, and there is very little carbon deposited in the retorts, in consequence of the lower pressure.

Yours faithfully,
(Signed) W. CRICKMAY,
Memb. Soc. Engineers.



APPLICATIONS TO BE MADE TO

Messrs. CHANDLER & SONS,

104, NEWINGTON CAUSEWAY, S.E.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER,

FOR

GAS PURIFICATION,

TAKES OUT EVERY TRACE OF AMMONIA AND A LARGE QUANTITY OF CARBONIC ACID AND SULPHURETTED HYDROGEN BY ONCE PASSING THROUGH THE MACHINE.

AMMONIACAL LIQUOR OBTAINED OF ANY REQUIRED STRENGTH.

The Cost of the Machine defrayed by the Ammonia obtained in Twelve Months.

It requires very little attention, and cannot get out of order.

THESE MACHINES HAVE BEEN SUPPLIED TO THE FOLLOWING GAS-WORKS:—

	Feet per Day.
The Gaslight Company, London—	
Beckton	5,000,000
Bromley	7,000,000
St. Pancras	3,000,000
Bradford Corporation	1,000,000
Bremen	150,000
Buxton Local Board	250,000
Dukinfield Local Board	500,000
Driffield Company	100,000
Goole Company	250,000
Glossop Company	300,000
Holywood Company	125,000
Heywood Local Board	600,000
Leeds Corporation	2,000,000
Leominster Company	150,000
Maidstone Company	1,000,000
Phœnix Company, Greenwich	2,500,000
" " Vauxhall	3,000,000
Woolwich Equitable Company	400,000
Yeadon Company	500,000

AND MANY OTHERS ARE IN COURSE OF CONSTRUCTION.

TESTIMONIALS.

Messrs. Kirkham, Hulett, and Chandler. *Engine-Works, Millbank, Westminster, S.W., March 5, 1879.*

Gentlemen,—In accordance with your instructions, I have taken diagrams from Vertical Engine driving your Patent Horizontal Washer-Scrubber to purify 60,000 feet of gas per hour on the works of The Gaslight Company at King's Cross, and find the following results, viz.:—

Horse power required to drive engine, shafting, and gearing alone	= 0·398
Total horse power with washer on	= 1·721
Absolute horse power required to drive Washer-Scrubber	= 1·323

(Signed) THOS. HORN.

Messrs. Kirkham and Hersey. *The Gaslight and Coke Company, Bromley-by-Bow, E., June 2, 1879.*

Gentlemen,—I have much pleasure in stating that the results of the working of Kirkham, Hulett, and Chandler's Washer-Scrubber, erected at these works in 1877, have been perfectly satisfactory, and that the two erected last year are doing well—all that you guaranteed; indeed, the effectiveness of the machine is so convincing, that I am induced to recommend another being ordered if you can undertake to have it erected complete before next winter. (Signed) W. B. WRIGHT, Engineer.

Messrs. Kirkham and Hersey. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Aug. 12, 1879.*

Gentlemen,—In reply to your inquiry, one of your Patent Scrubber-Washers to purify 100,000 cubic feet per hour was put into operation at these works on the 1st of June. At the same moment the whole of our Scrubbers, equal to 28,000 cubic feet, were thrown out of use, leaving your Washer the whole work of freeing the gas from Ammonia. This it has done to perfection up to date. With 10 gallons of water to each ton of coal carbonized passing through it we get a clean test at the seventh chamber, leaving four chambers margin for extra work. The mean quantity of Ammonia in the inlet (fixed and free) obtained from a large number of tests was 241 grains per 100 feet of gas. On the outlet—Free Ammonia—Nil. The quantity of water used is 10 gallons per ton of coal carbonized. The strength of liquor as follows:—

Chamber No.	1	2	3	4	5	6	7	8	9	10	11
Strength of liquor—ounces	Nil.	Nil.	Nil.	Nil.	0·4	1·0	2·2	3·5	5·5	8·25	12·5

We are working five revolutions per minute. It takes out all the free Ammonia, reduces the carbonic acid and sulphuretted hydrogen 30 per cent., requires a very small amount of power to drive, and altogether is, in my opinion, the best machine for the purpose yet invented, and will, I feel confident, ere long, entirely supersede the Scrubbers of to-day. I am glad to find you are going to fix one of these Washers at our Vauxhall works. (Signed) P. J. WATES, Engineer.

For Results and other Testimonials, see next week's Journal.

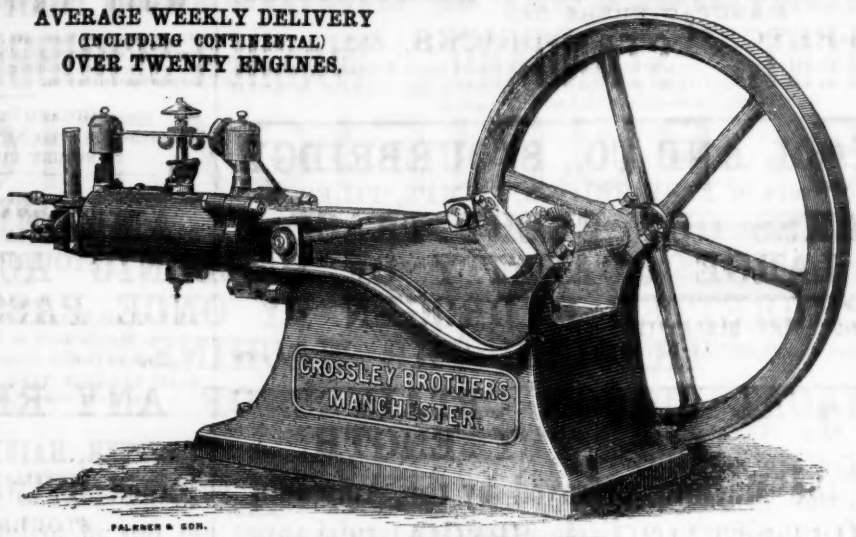
FOR FURTHER PARTICULARS AND TESTIMONIALS, ADDRESS MESSRS.

KIRKHAM, HULETT, & CHANDLER, Limited, { 59 & 60, Palace Chambers, Bridge St., Westminster, London, S.W.

AN ENGINE WHICH WORKS WITHOUT A BOILER OR STEAM

AVERAGE WEEKLY DELIVERY
(INCLUDING CONTINENTAL)
OVER TWENTY ENGINES.

The durability of these Engines is now established by experience, one of them having run night and day at the Hinckley Gas-Works for over Twelve months without any expenditure for repair; this being equal to about 2½ years average work.



FALKNER & SON.

Over 1900 already delivered.

Very numerous Testimonials from Users, including Engineers, Men of Science, and others, on application to the makers.

No trouble with Coal, Ashes, Smoke, Insurance, Water, or constant attendance.

No Glands to pack, or Water Gauges and Steam Gauges to watch.

STARTS AT A MOMENT'S NOTICE.

THE "OTTO" SILENT GAS-ENGINE.

(Otto and Crossley's Patents, 1876 and 1877,)

THEY ARE USED FOR ALL KINDS OF PURPOSES, CHIEFLY FOR EXHAUSTERS, SCRUBBERS, & PUMPS.

DELIVERED IN MANCHESTER. SIZES { NOMINAL HORSE POWER ½ 1 2 3½ 6 8 12 16 / MAXIMUM HORSE POWER ¾ 1½ 2½ 4 9 12 18 24 } OFFERED. CASES NOT CHARGED IF RETURNED FREE.

PRICES INCLUDE CAST-IRON STAND, TURNED FLY-WHEEL, AND DRIVING PULLEY; WATER-VESSEL, SEVERAL DUPLICATES, AND GAS-FITTINGS (EXCEPTING METER AND PIPES).

WORKS AND HEAD OFFICES:
Gt. Marlbro' St., Gloster St.

CROSSLEY BROTHERS,
MANCHESTER.

LONDON HOUSE:
116, Queen Victoria St., E.C.

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise 2000 tons per day of REAL OLD SILKSTONE GAS COAL.

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

GOLDSMITH'S PATENT SIGHT WATER-LINE INDICATING GAS-METER.

MANUFACTURED BY GUEST AND CHRIMES,

FOUNDRY AND GENERAL BRASS WORKS,
ROTHERHAM;
AND 85, SOUTHWARK ST., LONDON, S.E.

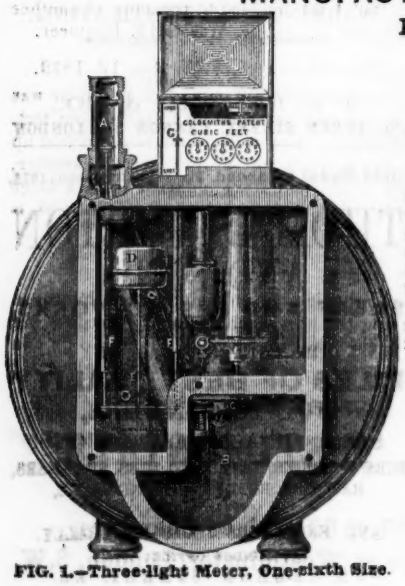


FIG. 1.—Three-light Meter, One-sixth Size.

Fig. 1 is a Meter with front removed to show the arrangement and connection of the Indicator and Valve.

Fig. 2 is front view of Index, with cover up.

The principal object of this invention is to render the water-line in the reservoir at all times visible. It will be seen, by reference to the illustrations, that this is accomplished in the following manner:—On the dial are the words "Open" and "Shut," and attached to the float is the pointer G, which rises and falls with the water-line in the reservoir. If the pointer is at "Open," it shows that the valve is open, and that the reservoir is full. If it is at "Shut," it shows that the reservoir is empty, and that the gas will be shut off.

The following ADVANTAGES will be obvious:—

1. The Inspector can see at a glance if the Meter requires water.
2. No more water than is required need be added, and therefore no water has to run out.
3. The Meter Inspector will be spared a great deal of his most objectionable work, and he will save a great deal of time and trouble.
4. The consumer will not always have to be asked for water, nor will he have to endure the unpleasant smell caused by waste water being run out.

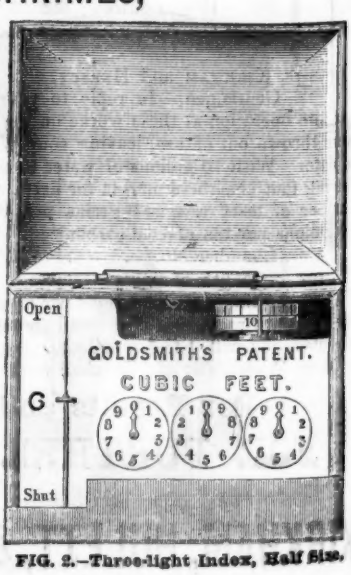


FIG. 2.—Three-light Index, Half Size.

EDWARD BROOKE AND SONS,

FIELDHOUSE FIRE-CLAY WORKS, HUDDERSFIELD,

MANUFACTURERS OF

GAS-RETORTS, FIRE-BRICKS, &c.,

Which have been extensively used for 30 years in the construction of Glass Furnaces, where the heat is five times greater than in Gas Ovens; superior to any Retorts or Fire-bricks in the market for standing intense heats, and not contracting.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

J. & H. ROBUS,

BUILDERS AND CONTRACTORS

FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

N.B.—All kinds of Fire Goods and Gas Apparatus supplied on the shortest notice.

Address:—J. & H. ROBUS, BELL GREEN, CATFORD, LONDON, S.E.

J. & J. BRADDOCK,

GLOBE METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY CONSUMERS GAS-METERS,

OF THE HIGHEST EXCELLENCE ONLY;

ROUND STATION-METERS,

ON CAST-IRON STANDS;

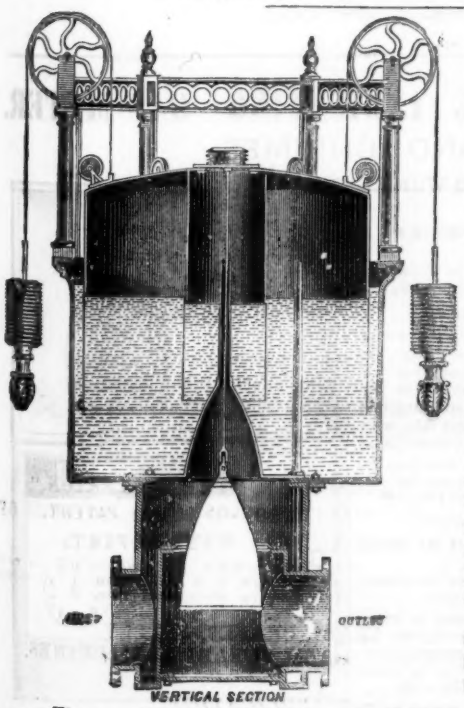
SQUARE STATION-METERS,

WITH PLANED JOINTS.

Messrs. BRADDOCK beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 30-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

C. & W. WALKER'S

WOOD PURIFIER SIEVES,

Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,
DONNINGTON, NEAR NEWPORT, SHROPSHIRE.
FINSBURY CIRCUS, LONDON.

MOBBERLEY & PERRY,

FIRE CLAY and BRICK WORKS,
STOURBRIDGE.

Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAY.
Manufacturers for Home and Export,
GAS-RETORTS, GLASS-HOUSE FURNACE,
BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,
And Every Description of Best Fire-Bricks.

TROTTER, HAINES, & CORBETT,

BRETTELL'S ESTATE
FIRE CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

ESTABLISHED IN 1860.

BENJAMIN CARPENTER,

THE ORIGINAL MANUFACTURER OF THE IMPROVED

WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

PROVIDENCE WORKS,
22, HERMES STREET, PENTONVILLE ROAD,
LONDON, N.

The Dunston Engine Works Co.,

GATESHEAD-UPON-TYNE.

Are the Sole Manufacturers of

Archer's Patent Hoists,

ALSO OF

Archer's Patent Stone Breaker,

AND OF

Archer's Patent Ore Crusher & Pulveriser,

The last-named Machine (without the Pulveriser) makes the best and most durable Coke Breaker.

GEORGE'S

Patent Gas Calorigen,

A STOVE FOR

WARMING AND VENTILATING.

RECOMMENDED BY DR. RICHARDSON.

MANUFACTURERS:

J. F. FARWIG & CO.,

36, QUEEN STREET, CANNON ST., LONDON.

Gold Medal Awarded, Paris Exhibition, 1878.

THOMAS TURTON AND SONS,

SHEAF AND SPRING WORKS,
SHEFFIELD,
MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS,

STEEL OF ALL DESCRIPTIONS,

SCREW STOCKS, TAPS, AND DIES, SPANNERS,
RATCHET BRACES, LIFTING-JACKS,
ANVILS, VICES,
AND ENGINEERS TOOLS GENERALLY.

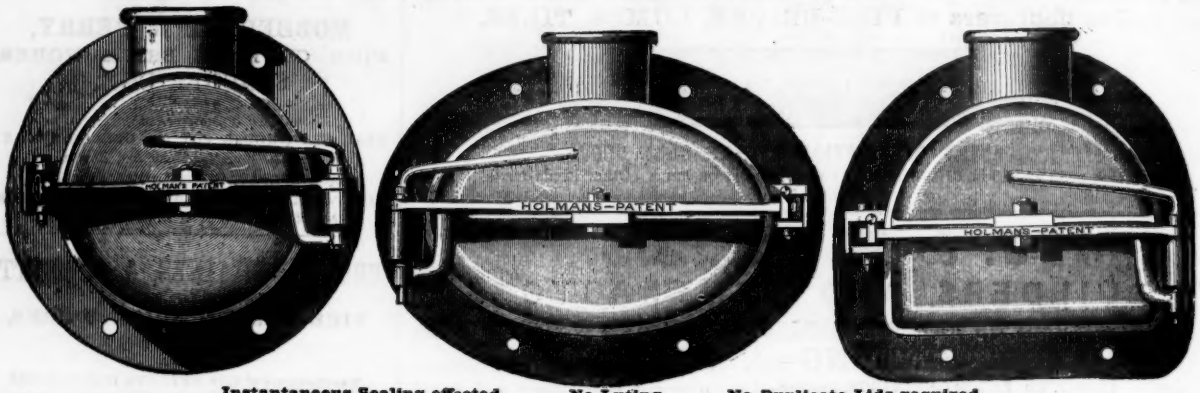
LONDON OFFICE:
90, CANNON STREET, E.C.

TANGYE BROTHERS AND HOLMAN,

CORNWALL HOUSE, QUEEN VICTORIA STREET, LONDON, E.C.

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,
Anti-Friction Catches, and Self-Sustaining Cross-Bars.



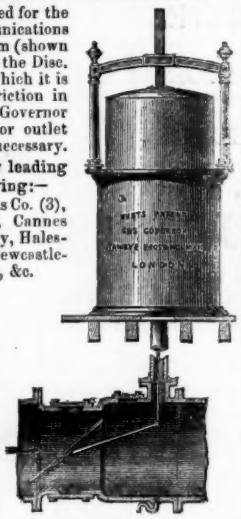
Instantaneous Sealing effected. No Luting. No Duplicate Lids required.
Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Morton's Patent Retort-Lids are in use in nearly all the Principal Gas-Works in the United Kingdom and the Colonies; also on the Continent and in the United States of America. They are now made of the

SAME FORM OR SECTION AS THE RETORT. (See Illustrations above.)

Engineers preparing Specifications of New Works will be furnished with Dimensions of Stock Patterns, together with Approximate Weight and other data on application.

HUNT'S
EQUILIBRIUM DIRECT-MAIN GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight & Coke Co. (19), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Leicester, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

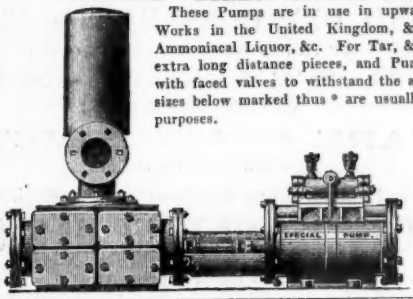
The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

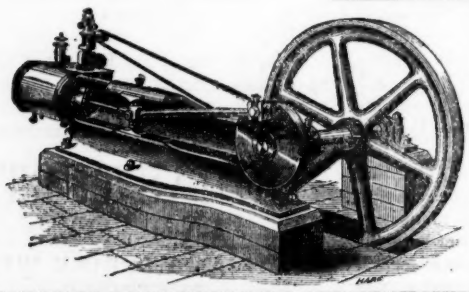
THE
"SPECIAL" DIRECT-ACTING STEAM-PUMP.



These Pumps are in use in upwards of one hundred Gas-Works in the United Kingdom, &c., pumping Water, Tar, Ammoniacal Liquor, &c. For Tar, &c., they are provided with extra long distance pieces, and Pumps are entirely of iron, with faced valves to withstand the action of the liquid. The sizes below marked thus * are usually kept in stock for these purposes.

The quantities delivered of Tar should be taken about two-thirds that of water.

Diameter of Steam Cylndr.	Diameter of Water Cylndr.	Length of Stroke.	Gals. of Water per Hour, Approx.	Prices for Water.	Prices for Tar and Ammoniacal Liqr.
*3 in.	1¼ in.	9 in.	450	£16 0 0	£17 0 0
*4 ,,	2 ,,	9 ,,	815	18 0 0	19 0 0
*5 ,,	2¼ ,,	12 ,,	1,230	21 0 0	22 10 0
*5 ,,	3 ,,	12 ,,	1,830	22 10 0	24 0 0
*6 ,,	3 ,,	12 ,,	1,830	25 0 0	26 10 0
*6 ,,	4 ,,	12 ,,	3,250	30 0 0	31 10 0
6 ,,	5 ,,	12 ,,	5,070	35 0 0	36 10 0
*7 ,,	5 ,,	12 ,,	5,070	40 0 0	41 10 0
7 ,,	6 ,,	12 ,,	7,330	45 0 0	46 10 0
*8 ,,	6 ,,	12 ,,	7,330	50 0 0	52 0 0
10 ,,	6 ,,	12 ,,	7,330	60 0 0	62 10 0
10 ,,	8 ,,	12 ,,	13,000	75 0 0	77 10 0

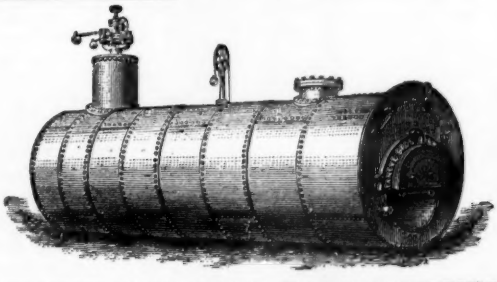


TANGYE'S HIGH-PRESSURE STEAM-ENGINE,
NEARLY 4000 IN USE.

The Design, Workmanship, and low prices of these Engines have called forth universal approval.

Nom. H.P.	2	3	4	6	8	10	12	14	20	25
	£28	£37	£44	£68	£86	£111	£122	£133	£185	£215

Including Governor and Feed Pump. Variable Expansion extra.



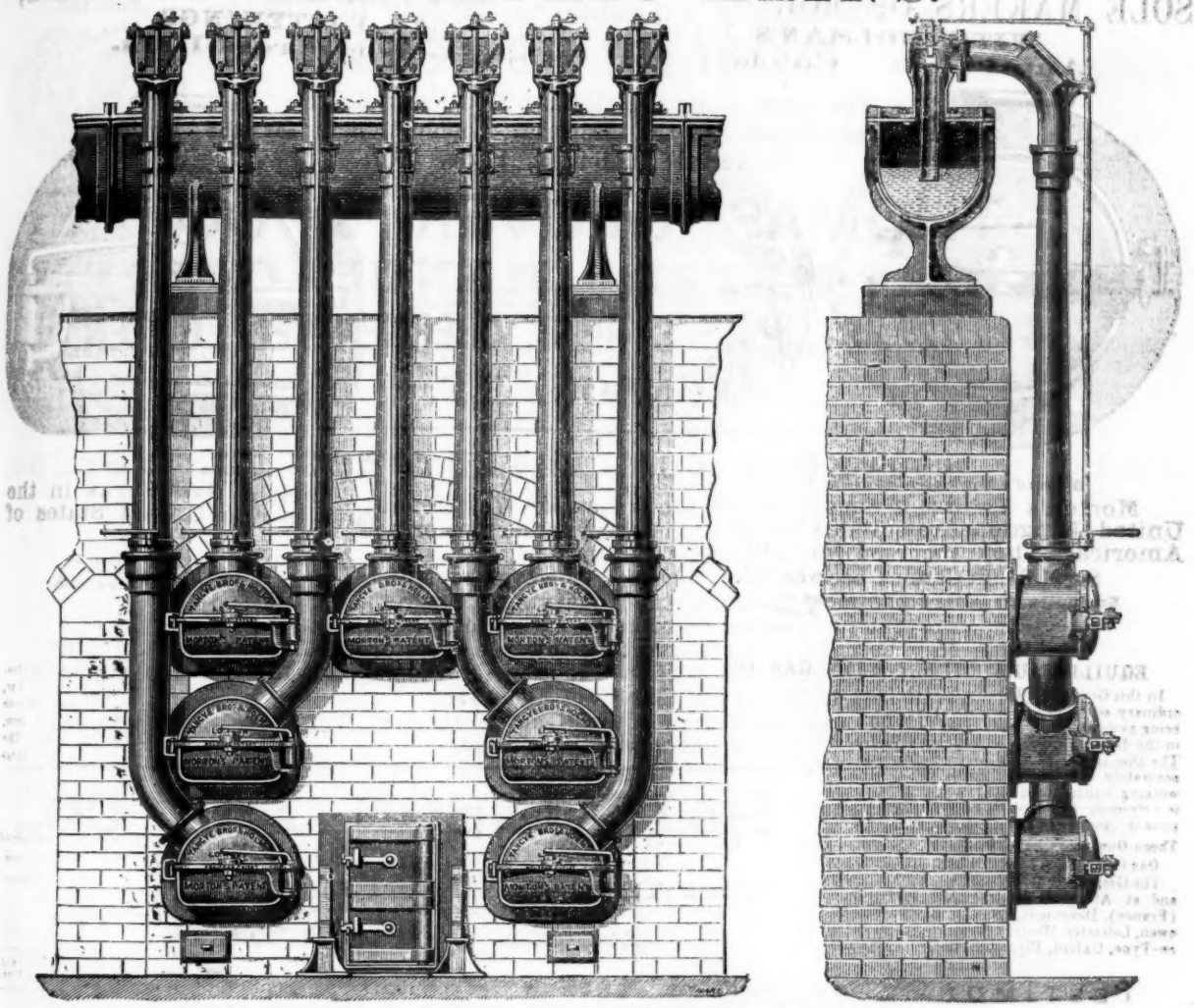
CORNISH, LANCASHIRE, "THE KESTERTON," VERTICAL, AND MULTITUBULAR STEAM-BOILERS OF SUPERIOR QUALITY ALWAYS IN STOCK.

This Department having been greatly extended and furnished with the most approved Boiler-making Machinery and Tools, T. B. & H. are prepared to supply all kinds of Steam-Boilers with great facility at lowest current prices.

Also Makers of IMPROVED HYDRAULIC HOISTS, TRAVELLERS, CRABS, CRANES, PULLEY BLOCKS, HYDRAULIC AND SCREW LIFTING JACKS, LATHES, PUNCHING AND SHEARING MACHINES,
And all other Descriptions of Tools, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, &c., ON APPLICATION.

HOLMAN'S PATENT
NON-PRESSURE VALVULAR SEAL-PIPES
FOR
HYDRAULIC MAINS.



The salient features of the above arrangement are as follows:—

1. The Seal is instantaneously opened and closed from the stage by the stokers.
2. There are only two positions for the actuating lever: one when the Seal is opened during the period of carbonization, the other when it is closed for drawing and charging the retort.
3. The retort can never be blocked, beause the port directing the gas *through* the Seal is always opened, and the port permitting the gas to *pass* the Seal *direct* into the hydraulic main is also open while the retort is at work.
4. The manager and stokers can always see at a glance, by the position of the lever, whether the retort is duly unsealed while carbonizing its charge.
5. There are no extraneous seals, stuffing-boxes, hinges, screws, chains, pulleys, springs, teeth, or other complication belonging to the valves; they are made plain and strong for rough use, and will last many years without renewal.
6. The valve faces are always covered and never separated, hence no foreign matter can put them out of action.
7. They are positive, reliable, interchangeable, free from all the uncertainty of automatic arrangements, and low in price.
8. No extra pipes or connections are required, because the Valvular Seal-pipe is self-contained in the single branch of the ascension-pipe, which stands on the hydraulic main, and is easily accessible by removing an ordinary cover secured by two bolts only.

(238) TWO HUNDRED AND THIRTY-EIGHT HOLMAN'S PATENT VALVULAR SEAL-PIPES are being fitted to the Hydraulic Mains at the Radford Station of the Corporation Gas-Works at Nottingham.

(84) EIGHTY-FOUR more are being fitted to the Mains in the New Retort-House of the Gas-Works at Brentford, and they can be readily applied to existing Hydraulic Mains generally.

They are to be fitted to the Hydraulic Mains of the New Retort-House at the LONDON GAS-WORKS, and at other large stations.

Mr. MORTON writes in the following terms, under date of Feb. 3, 1880:—

"Gentlemen,—I have determined to use your HOLMAN'S PATENT NON-PRESSURE VALVULAR SEAL PIPES in our new Retort-House. Will you, in the meantime, send me, as soon as you can, four as you are now making them. I expect to hear of a large demand for these Pipes. I like the idea of always maintaining a passage through an ordinary dip."

ESTIMATES for Retort Work, including Mouthpieces fitted with Morton's Patent Self-Sealing Lids and Holman's Self-Sustaining Cross-Bars and Fastenings, Hydraulic Mains and Ascension-Pipes, fitted with Holman's Patent Non-Pressure Valvular Seal-Pipes complete (as per accompanying illustration), will be forwarded to Engineers on receipt of particulars of intended erections, or re-setting of Retorts during the current or ensuing season.

Engineers preparing Specifications will be furnished with Tracings and all necessary data on application.

Sole Makers:

TANGYE BROTHERS AND HOLMAN,
HYDRAULIC AND GAS ENGINEERS,
CORNWALL HOUSE, QUEEN VICTORIA STREET, LONDON, E C.

London, 1851 New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters bv the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

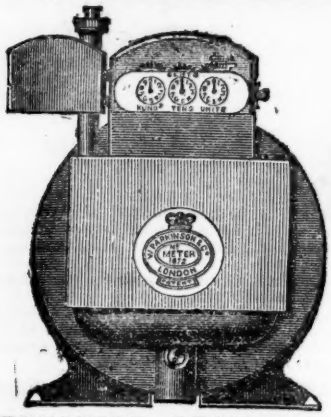
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS.

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,

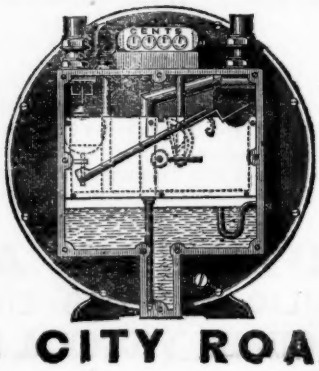
STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

An interesting report by Mr. Newbigging, on the Heywood Local Board Gas-Works, already in type, as well as several other reports, &c., are obliged to be deferred till next week.

SOUTH-WEST OF ENGLAND DISTRICT ASSOCIATION OF GAS MANAGERS.—*Our report of the meeting of this Association, at Taunton, on Tuesday last, is also unavoidably held over.*

C. E. J.—*Thanks for information. Shall be pleased to refer to the matter in next issue.*

J. H.—*Received yesterday—too late for notice in to-day's* JOURNAL.

B. T.—*The balance-sheet you forward exhibits a very satisfactory state of affairs indeed.*

ERRATUM.—*In some copies of last week's* JOURNAL, *p.* 358, *second column, 37th line from bottom, for "successors" read "predecessors."*

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 16, 1880.

Circular to Gas Companies.

THE scheme for the amalgamation of the South Metropolitan and Phœnix Gas Companies still remains unconfirmed; but we are in a position again to state that not the least obstacle exists to its confirmation. It simply awaits the pleasure of the President of the Board of Trade in sending it forward to the Privy Council, and as there will be a meeting of the Council next Thursday at Windsor, we fully anticipate that in our next issue we shall be able to announce that the scheme has been sanctioned. The position of the Companies implicated in the scheme will not, of course, be changed. We have repeatedly said that the success of the proposal would involve the withdrawal of the Bill promoted by the Phœnix Company, and we understand that this has now been resolved upon. The measure promoted by the South Metropolitan Company will go forward, and we hope will be passed this year, as it is very desirable that the united Company should obtain the powers asked for as early as possible. It will be none too soon to commence next year their new works at Greenwich. To effect their completion will occupy a long time, and as soon as they can be brought into working order we are satisfied that the wants of the united district will require them.

We learn from Lieut.-Col. W. Haywood's report on the proceedings of the Commissioners of Sewers of the City of London during the year 1879, an abstract of part of which will be found in another column, that the experiment made with the electric light on the Holborn Viaduct was not a success, economic or otherwise. The light proved to be expensive—6s. 3d. per lamp per night—and the illumination was not more than twice that afforded by an ordinary gas-lamp. When so many complaints are made about a defective supply of gas to public lights, it is very satisfactory to find Lieut.-Col. Haywood reporting that the quantity contracted for in the City is regularly supplied. The Commissioners of Sewers have a certain number of metered lamps which establish this fact, and they also have inspectors whose experience enables them by the eye alone to decide that the full quantity of gas is being consumed in the other lamps. In all probability, in many cases, more than the contract quantity is being burned; for we have ourselves often been deceived, guessing that five feet were being consumed, when, as a fact, eight or more feet were burning. It is to be regretted that the use of the improved gas-lights in Queen Victoria Street was so quickly discontinued, but there is no answer to the fact that after business hours the traffic in that street is not great. The vehicular traffic is considerable up to a late hour; but foot passengers, except those on their way to the Metropolitan District Railway, get few and far between as the day closes.

We understand that the Trustees of the British Museum have determined to continue the use of the electric light *en permanence* in the Reading Room, and that the Royal Albert Hall Corporation have decided to re-introduce the Siemens light at the hall, with the improvements recently made by Dr. Siemens. The use of the electric light in large interiors seems likely to spread, more especially in such cases as where free ventilation cannot be effected, and we are not surprised to learn that the transformed tavern in the basement of the Royal Exchange is to be illuminated by its means.

The Hastings and St. Leonards Gas Company held their half-yearly meeting on the 4th inst. The report of the Directors necessarily showed a highly prosperous state of affairs. The working accounts for the past half year testify that the profits of the Company amounted to £4141. When full dividends on both classes of shares have been paid, there will remain a balance of £471 to be carried forward to the next account. Hastings, like every other south coast watering-place, grows, and larger demands are each year made upon the Gas Company. To meet these, the Directors and their indefatigable Manager, Mr. A. H. Wood, A.I.C.E., have decided to make considerable additions to their carbonizing plant. These, it is hoped, will be brought into use before the dark nights of next winter come on, and Hastings, with its extensions, will have the best gas supply the inhabitants could possibly obtain.

The Dover Gas Company held their half-yearly meeting on the 2nd inst. The Company, of course, pay their ordinary dividends, and, after adding to their reserve-fund, carry forward a considerable balance. In addition they also pay a bonus of one and a half per cent., in liquidation of the deficit of dividend in 1864. Better than this, the Directors are able to announce a reduction of threepence per thousand feet in price from July next, making the charge for the future 3s. 6d. instead of 3s. 9d. per thousand. The natural growth of the consumption of gas in Dover enables the Company to make this reduction without any risk to the dividends. There is, of course, the reserve-fund to fall back upon, and this will be sufficient to prevent any deficiency arising after the payment of full dividends.

The Directors report and statement of accounts of the Crystal Palace District Gas Company, issued in anticipation of the half-yearly meeting to be held on the 25th inst., are before us. The report of the Directors tells us in a succinct form the state of the balance-sheet for the past half year. The Company have made a profit during the half year to the amount of £11,986, which enables them, after clearing off all preference charges, to pay the ordinary Shareholders ten per cent., and to carry forward a balance of £1352. The report of the Gas Examiners shows, as usual, that the quality of their gas is well maintained, the illuminating power being above the standard; while sulphuretted hydrogen was entirely absent. In such well-managed works as those of the Crystal Palace District Gas Company, the absence of ammonia is not so much to be wondered at. Every grain of it is of value, and is fixed for the profit of the Company.

The Bromley Gas Consumers Company held their half-

yearly meeting on the 26th ult. The faces of the Directors did not look cheerful when they had to announce to the Shareholders that it was necessary to make a draw on the reserve-fund in order to pay their full statutory dividends. That fund, however, was more than sufficient for the emergency, and no doubt what has been abstracted this half year will be replaced in the next.

The Dewsbury Corporation seem to have been fairly successful with their gas undertaking during the past half year. They are dreadfully overloaded with capital; which, in fact, amounts at the present time to £34 8s. 5d. per ton of coal carbonized. As regards the working, we notice that during the past half year there have been obtained from a ton of coal, with the aid of 6·41 per cent. of cannel, 10,002 cubic feet of gas, of which 8941 feet are accounted for. The large leakage is occasioned by breakages in the pipes which pass through a portion of the district that is undermined. The rest of the details are equally in favour of the Manager (Mr. Charles Eastwood), and it may be said, to the credit of the Corporation of Dewsbury, that they only appear to make a profit of £942 upon a sale of 56,552,400 feet of gas. We purpose publishing an abstract of the accounts in next week's issue.

It is a gratifying fact that gas managers have turned their attention to the electric light, and have sought in what way to determine its advantages in regard to cost. The best opportunity which has yet been offered has been presented to Mr. W. Chew, of Blackpool, the Corporation of which borough a year ago determined to illuminate their Promenade with the electric light. A notice of the display was furnished to us at the time by a correspondent, but a more detailed account of the proceedings in connection therewith was given by Mr. Chew, in the paper he read at the recent meeting of the Manchester District Institution of Gas Engineers, and reported in another column. Of course, the Corporation discarded all consideration of cost. They knew very well that the gaping crowds who would come to view the new light would fill the publicans pockets, while the more tender sex would occupy apartments let at prices which would so far satisfy the proprietors that a little extra taxation would not be felt. We shall not go farther, or we might ask what the poor shopkeepers behind the Promenade, and not particularly interested in the display, felt. But, after all, according to Mr. Chew, the expense incurred in the installation of the light has not been large, seeing what the power of illumination is. The lights used in Blackpool differ from those employed in most exhibitions, being naked—that is to say, they are simply enclosed in plain glass lanterns, not opal or frosted. The intensity of these lights is most remarkable, Mr. Chew asserting that he could read his watch a mile and a half from the lights. But it must be observed here—and the fact is worthy of all recognition—that the electric light does not answer well in a fog. When Mr. Chew read his watch, heavy cumuli were floating about in the sky, reflecting every beam of light emitted from the electric lamps. After all Mr. Chew has said, we are not quite clear as to the cost of the electric light in comparison with gas. We gather most decidedly that in Blackpool it is not cheap, and the Corporation never meant it to be so. They had one object in setting up the lights, and that was to attract visitors. In this they succeeded well, and any additions to the rates which may be imposed in consequence will, no doubt, be cheerfully paid, at all events by those most directly benefited by the display.

The substitution of mechanical for manual labour in gas-works is to our mind highly desirable. We once heard a popular orator describe, by anticipation, the day when it should be the duty of the material world to do all the work, and the privilege of man to stand by and see it done. The orator did not speculate on what would be the circumstances of the man on Saturday night; but that is nothing to do with the question before us. We have here only to call attention to the comparative experiments recently made at the Rochdale Road gas-works of the Manchester Corporation, with the West and Foulis apparatus for drawing and charging retorts. It must be observed here that Mr. West's system includes more than a novel form of apparatus for charging, &c., the retorts. The principle of light charges and short high heats is introduced. In the trials at Manchester to which we allude, and a table of the results of which will be found on another page, both experimenters were placed under similar conditions. So far as we learn, the advantage lies with the West system, under which (without enumerating minor considerations) the make of gas per ton of coal carbonized was greater, the illuminating power of the gas produced was higher, and there was a considerable saving of labour. We shall return to this subject when the report of the Gas Committee to the City Council on the experiments is before us.

Water and Sanitary Notes.

It is all over with the Metropolis Water-Works Purchase Bill! Mr. Cross, apparently frightened at the opposition threatened, has withdrawn the Bill, and it no longer appears on the papers of the House of Commons. There is no doubt that if the Bill had gone on, an amount of opposition would have been raised which would in all probability have quite sufficed to ensure the defeat of the measure. The Home Secretary seems to have seen this clearly. He was mislead by his advisers in the first instance, and placed in a difficult position, from which he could hardly escape except by abandoning the Bill. He has done so, we have no doubt, with very great reluctance, for he started with an honest endeavour to serve, as he thought, the interests of the ratepayers, while he did justice to the Water Companies. Having satisfied the Companies, he, no doubt, indulged a hope that the Metropolitan public would be no less satisfied, and that the bargain made under his supervision would be at once accepted. How he was disappointed we all know. With one consent the Press and the Metropolitan Authorities repudiated the bargain, so there was nothing for it but to withdraw the measure, which Mr. Cross did in a somewhat petulant spirit. But now comes the most curious phase of the business. No sooner is the Bill withdrawn, than those who might be expected to be its most strenuous opponents, turn round and profess to find in the measure a sound basis for a settlement of the business. They, of course, protest that it is highly desirable that the water undertakings should be in the hands of the public authorities, which is freely admitted on all sides; but the conditions on which the undertakings are to become the property of the public form another part of the question, and on this matter there are two opinions. The valuators called in by the Home Secretary put upon the undertakings a certain price, which was embodied in the Bill we noticed last week—a Bill which was at first sight rejected by the Metropolitan Authorities. But, on reflection, the popular agitators seem to have discovered that, under the circumstances, the terms of purchase are as good as were to be expected. They were, but now comes the quinquennial Metropolitan valuation, under which the Companies will have it in their power to raise their rates according to the increased value; and it must be quite understood that the legal right of the Companies to do this is thoroughly assured. Under their special Acts they have power to charge water-rates upon the annual value of the premises supplied.

A great outcry is made against the assessment of water-rates according to the annual rateable value of the premises furnished with water. The Earl of Camperdown as well as Mr. Goschen are anxious to prevent any elevation of the rates in consequence of the new valuation. The question of the purchase of the Companies is, if we understand Mr. Cross's Bill, settled on a given basis; but supposing a new basis of rating be introduced, it seems to us clear that it would not affect the position of the Government measure. One thing remains to be settled, and that is the basis on which the Companies, which we hope will long continue to exist, shall fix their charges. To charge on annual value seems to many, and is, we admit, in a large number of cases, unjust; but what other system can be adopted? We have repeatedly endeavoured to show that charges by meter are at present impossible. Upon what principle, then, shall the Water Companies regulate their charges? There is but one that we know of, and it is the rateable value of the premises to which the water is supplied. A great many other suggestions have been made, as, for example, the number of rooms in the houses supplied; and, again, the number inhabiting the apartments of the houses. It will be perfectly clear to all who study this part of the question that any foundation for a charge on such basis would be perfectly untenable. There is thus nothing to fall back upon but rating according to annual value. Then comes the momentous question as to whether the Companies shall have the right to increase their rates according to the enhanced valuation of Metropolitan house property. It is contended that this must not be; but where are we to stop? When is the day to be fixed beyond which no further advance shall be made in the Water Companies rates? It is all very well to say that the Companies must have their legal rights, but these rights we may just as well admit ought to be defined.

Sir Charles Dilke very reasonably asks for a return of the financial statement on which the calculations are based of the payments to be made to the several Metropolitan Water Companies, as proposed in Mr. Cross's Bill. To this return the honourable baronet is perfectly entitled. It is not to be endured, on whatever side we look, that any secret proceeding shall influence the action of Government. The public are fully

entitled to know the exact worth which the valuers set upon the undertakings of the individual Companies; therefore we, having regard for the interests of all Companies, desire to be fully informed of the details upon which the Government assessors arrived at their conclusions. But now comes a curious question. What caused the sudden dissolution of Parliament? Politically, there was no reason why Parliament should not have gone on until the autumn, which, it may be, would not have been so convenient a period for the dissolution—that is, for the Government—but which would, if we may for one moment indulge in ordinary politics, have served the country much better. What, then, did it? The Metropolitan Water Bill, we are told. Perhaps it did. We are very sorry, however, that the arrangements which were made by the Home Secretary have fallen through; but nothing less was to have been expected when the terms of the bargain were made public. The extraordinary rise in the price of the shares of the Water Companies showed at once what financial speculators thought of the scheme. The shares of the Southwark and Vauxhall Company, who had been under a cloud, and whose dividends had been for some years exceedingly small, suddenly rose from 113 to 279, clearly showing that the Government bargain was fully appreciated on the Stock Exchange. The speculators, however, well know that the permanent interest of the Companies lies beyond their recognition. Already a considerable depreciation has been experienced, and we may anticipate that within a short period the shares of the Metropolitan Water Companies will have fallen to their normal values. What they will ultimately come to we cannot undertake to say; but this much may be averred, that for a considerable period to come the prices of shares in Metropolitan Water Companies will be settled by dividends rather than by any speculative opinions which may be formed as to a possible purchase.

It would seem, from the utterances of Mr. Gladstone and Mr. Fawcett, both of whom will be members of a Liberal Cabinet, if such a thing should ever be formed, that a Whig Government will not endorse the bargain made by the present Home Secretary. Mr. Cross, in one of his early addresses on the subject in the House of Commons, plaintively acknowledged that the terms, although not so good as he could wish, were the best that could be obtained from the Water Companies. The Metropolitan public—at all events, the few who have taken any notice of the matter—immediately repudiated the bargain; but no sooner is attention drawn to the probable effects of the coming new valuation, than the leading agitators against the Companies turn round and acknowledge that although the Government Bill is not all that could be desired for the ratepayer, it ought to be proceeded with, and thoroughly investigated before a Select Committee. We quite agree for once with the water agitators, and shall be glad if the Bill be proceeded with in the first session of a new Parliament. More than that it is hopeless to expect, for, recognizing the difficulties which surround legislation of this kind, we must admit that the chances of the Bill are not hopeful. What would be thought if we asked for a Home Rule Parliament for the Metropolis? One thing has to be said, and that is that the Shareholders in the Metropolitan Water Companies are scattered all over the world, and their interests must be attended to. It seems, however, perfectly clear that the whole business is at an end for the present session, and probably for the present year. The Water Companies will go on as they have been going, and the Shareholders will fare as well as they have fared, and that is extremely well. It is certain, then, that but little satisfaction will be gained, except by speculators, some of whom, perhaps, have not fared at all well.

We have been asked more than once what the Metropolitan Water Companies are to do under the changed aspect of affairs. We give but the one answer we have made for years, and that is, "Amalgamate." We have no particular love for the Southwark and Vauxhall Company, but we do admire their pluck in coming forward to effect the greatest boon that could be conferred upon the Metropolitan water consumers, and also to the interests of the united Companies. We do not want Government interference; we want freedom of action, and with that secured we feel certain that everything the Metropolitan water consumer may require will soon be settled.

The Trowbridge Water Company held their annual general meeting at Cambridge on the 28th ult. This Company, after a rather severe struggle during their short existence, have at last become fairly prosperous. In a town like Trowbridge, it is not likely that big dividends will ever be realized; but we have no doubt that as time moves on, and as the West of England cloth trade revives, the Company will find themselves in circumstances to pay something approaching to their maximum dividends.

The Wakefield Corporation have carried their Bill through a Committee of the House of Lords, and Wakefield, it is to be hoped, will soon be supplied with something better than the filthy mixture hitherto extracted from the Calder. The old Company, we believe, did their best to make the mixture palatable and wholesome, and, so far as the rate of mortality goes, it seems to show that although the excreta of half a million of people and the refuse from numbers of dye-works were poured into the Calder, they had no deleterious effect on the health of the inhabitants. Perhaps, after all, there is some virtue in magnetic carbide. It is, however, a happy thing that Wakefield is to have a supply of water from a catchment system, the wholesomeness of which will be beyond suspicion. Probably we shall never again see a popular lecturer writing in visible bold text with the water from the intake of the Wakefield Corporation.

An interesting report recently presented to the Commissioners of Sewers by Lieut.-Col. Haywood, C.E., gives an account of what has been done for the City during the past year in the way of public water supply. We read that the whole fire hydrant system is now complete, and that 818 hydrants have been fixed in the City. A large number also have been placed to enable the streets to be washed by jet and hose. This system is extremely effective, and should be more largely employed. The stand-pipes which the Commission fixed, to afford a constant supply to the poor, are being rapidly rendered useless because there are so few poor to be supplied, their dwellings having been demolished under the powers conferred by the Artizans Dwellings Improvement Act. There is an evident desire on the part of the Commission to improve the poor out of the City, though they have not quite succeeded up to the present.

YESTERDAY'S PRICES OF GAS AND WATER SHARES.—Mr. A. G. Prater, Stock and Share Broker, of 23, Cornhill, gives the following as the closing prices yesterday of some of the principal gas and water shares:—

Gas Companies.	
Brentford	144 —148
Brighton . . (ex. div.)	33 — 35
Brighton and Hove . .	34 — 35
British	34 — 35
Commercial	185 —187
Continental Union . .	19⅜— 20½
Do. 7 per cent. Pref. .	23½— 24½
Crystal Palace District.	173 —176
European	18 — 19
Gaslight and Coke "A"	176 —178
Imperial Continental .	179 —181
London	175 —180
Phœnix	35½— 36½
South Metropolitan "A"	198 —202
Do. "B."	178 —182
Water Companies.	
Chelsea	199 —203
East London	198 —202
Grand Junction	113 —115
Kent	285 —290
Lambeth	203 —206
Do. 7½ per cent.	170 —175
New River "New" . .	355 —365
Southwark & Vauxhall.	204 —207
Do. "D"	168 —173
West Middlesex	170 —174

LEOMINSTER GAS COMPANY, LIMITED.—The Directors of this Company, in the report presented to the thirty-third half-yearly meeting of Shareholders on the 4th inst., state that the accounts for the year 1879 show a net profit of £617 18s. 4½d., while the balance brought forward from 1878 was £98 18s. 11d. A dividend at the usual rate was paid for the half year ending June 30, and the Directors recommended that a dividend at the same rate—viz., 10 per cent. per annum on the original shares, and 7 per cent. per annum on the B shares, be declared for the half year ending Dec. 31. The balance to be carried forward would then be £19 7s. 3½d. The consumption of gas by private consumers was 8,369,000 feet, an increase of 296,300 on that of 1878, or barely 4 per cent. An exhauster, a Kirkham, Hulett, and Chandler's patent washer-scrubber, driven by a gas-engine with Fison's regulator, and other apparatus, had been erected and brought into operation since the commencement of the present year. They appeared likely to realize the expectations formed of them. The sale of coke and other residuals continued good. The works were in a very complete position, and no further outlay of importance was likely to be required for some time to come.

ILFRACOMBE GAS COMPANY.—The annual general meeting of this Company was held on the 3rd inst.—Mr. Wivell in the chair—when the report presented stated that after allowing for interest on loans, Directors and Auditors fees, &c., there was a balance of £1551 9s. 1d., out of which the Directors recommended a dividend at the rate of 7 per cent., together with 3 per cent. back dividend (1874) on classes A and B, and 4 per cent. on class C shares, free of income-tax, leaving a balance to be carried to the current year. In moving the adoption of the report, the Chairman congratulated the Shareholders upon the nature of the balance-sheet, which, he said, must be highly satisfactory, considering that the last season in Ilfracombe was both wet and short. Notwithstanding this, the Company had an increased revenue of £221. The illuminating power of the gas had been kept far above the standard required by their Act of Parliament, by which they were compelled to give only 14-candle gas, whereas it had hardly ever been below 15½ or 16 candles. The public were, perhaps, not aware that this increase in the illuminating power was tantamount to a reduction in the price of gas; but it was so, as it enabled them to exercise greater economy in its consumption. Another thing which should be mentioned was that the Directors had determined to lay all pipes for consumers to the outside of their houses, provided the distance did not exceed 20 feet from the mains. During the year, the whole of the works were kept in a most efficient state, and when renewals had been required, they were done, and charged to revenue account. A large iron tank had been erected for storing tar and ammoniacal liquor, these products having now become very valuable, and the Directors hoped by another year to feel the benefit of this outlay. The report was adopted, and the retiring Director and Auditor were re-elected. On the motion of the Chairman, it was resolved to commence a reserve-fund, and £200 was set apart for the purpose. The proceedings closed with the usual votes of thanks to the Chairman, Directors, and Officers of the Company. At a subsequent meeting of the Directors, it was resolved to make a reduction in the rent charged to consumers for meters.

THE METROPOLITAN WATER QUESTION.

CALMER considerations may yet prevail with reference to Mr. Cross's Bill for the purchase of the Metropolitan Water-Works. Even Mr. E. J. Watherston, presiding at a meeting of Vestry delegates on Friday last, declared that the Government Bill "had not been properly understood," and he contended that though the terms of the Companies were "Shylock-like," yet they were "better than no terms at all." In harmony with the remarks of their Chairman, the Vestry delegates adopted a resolution moved by Mr. James Beal, declaring that although the Bill proposed "excessive terms of purchase," yet it was desirable that it should reappear in the next Parliament, and be referred to a Select Committee. The Home Secretary, in reply to Alderman Cotton in the House of Commons last Tuesday, announced that "the Bill would not appear on the "paper again this session." "At present," said Mr. Cross, "the public are not willing to pay the price for which the "Companies are willing to sell, and so ends the matter." But a desire manifests itself in certain quarters that the question, having been opened, should not be so speedily closed. It is thought—though we do not see the foundation for such a hope—that the selling price to which the Companies have consented might be reduced, should the Bill get before a Select Committee, despite the argument of the Marquis of Hartington to the contrary. Mr. Cross would, doubtless, like his Bill to undergo careful examination, so that the outside world might understand the financial part of the question better than it does at present. As it is, the public have taken fright at the wild speculations on the Stock Exchange, and have judged of the purchase clauses of the Bill solely by reference to the inflated quotations of the share market. The idea was thus conceived that the Water Companies had made a bargain by which the Shareholders would be enormously enriched, and for a while every other consideration was lost sight of, both by the Press generally and by the public.

On the whole, we are glad to find that the dread of Dr. Frankland's "living and moving organisms" has taken less hold on the popular imagination than might have been expected. Not germs, but gold, would seem to rule the question. "What have we got to pay?" is the burden of the appeal. The witchery of "*Sanitas sanitatum, omnia* "*sanitas*," has failed. The Metropolitan ratepayers are not so much afraid of the water supply as they are of the Three-and-a-Half per Cent. Water Stock. The theme might suit the pen of the Sage of Chelsea. Mr. Cross has clearly overestimated the extent to which the public have been educated to believe that the London water-mains are only modified duplicates of the sewers that lie beneath them. People are not so much alarmed, after all, but rather scout the notion that the question is actually "Your money or your life." They expect to live, even if the Water Companies remain in possession; and the Home Secretary must feel not a little disappointed at this issue of his well-meant endeavours. He proposed to "improve the supply" and "diminish the "expense," and is met with a roar of derision, such as seems even to have disturbed the serenity of the Cabinet, and hastened the dissolution of Parliament. Every one of the Metropolitan seats was likely to be lost. Bulgarian atrocities were as nothing compared with the Metropolis Water-Works Purchase Bill; and a Government which could face the Zulu and the Afghan was unable to face the London ratepayer, excited to madness with the notion that the Water Companies were better diplomatists than Mr. Cross. The Press has raged, the Vestries have been perplexed, and the Water Question has fairly overwhelmed the Government. The history of this strange affair—as yet only half written—is so far instructive as showing that, while great Imperial questions affect the temper of politicians, local matters are apt to exercise a very practical influence on great masses of the people. We have reason to know that the Metropolis Water-Works Purchase Bill is viewed with a very lively interest far outside the area which it more immediately concerns, and that in some of the large towns of the kingdom the question is debated with singular keenness. The Czar and the Sultan are important personages; but the rate collector stands at our door.

The Purchase Bill being thus checked in its career, the parties who may be considered primarily antagonistic to the Water Companies are anxiously estimating the consequences of delay. They have been puzzled of late to know exactly where they were, and they are still more concerned as to where they will be. Mr. Goschen has asked Mr. Cross whether he can see any way by which to stop the Companies from raising their charges "pending further legislation on "the subject;" and Mr. Cross has given an answer which practically amounts to a negative. A new assessment of the Metropolis is about to take place under the Valuation Act of 1869, and it is apprehended that the Companies will levy their rates according to the enhanced value which may thus be given to house property. London is not a decaying city, otherwise the levying of the water charge on the basis of the annual value would be looked upon as a very just and proper thing. London is prosperous, but it is not considered desirable that the Water Companies should share in the prosperity. When the assessment goes up the Companies are to charge no more; when it goes down, they must, of course, charge less. Such is the doctrine which lies at the root of Mr. Goschen's philosophy on this subject, and the same is to be said of the Earl of Camperdown, who is to urge the question to-day in the House of Lords. Perhaps somebody will bring forward a Bill prohibiting the aristocratic owners of house property in the Metropolis from raising their rents when building leases fall in. The idea that the Water Companies are to remain *in statu quo* while Bills are tossed about in Parliament, is one which no Government will be able to entertain. Mr. Cross could go no farther than to say that if he found on the part of the Companies any intention of raising rents for the purpose of enhancing the price to be paid for their undertakings, he should recommend Parliament to pay no attention whatever to such augmentation. While Mr. Cross could say no more, perhaps he went a little beyond the mark in saying so much as he did. So long as the Companies act within the limit of their powers, they are not amenable to penalty, whether such is to be inflicted directly or indirectly, though it is to be hoped that they will exercise their privileges in future with the same amount of moderation as has hitherto characterized them.

Mr. Watherston is wiser than some who ought to be wiser than he. In his speech at St. Martin's we find him saying, "If the Bill be withdrawn as a result of opposition, factious "or otherwise, the position of the ratepayers will be materially "impaired." "Financially," he says, "this is certain to be the "case," and in proof he adverts to "the prospect of the "approaching assessment." We understand Mr. Watherston when he says these things, though we do not quite agree with him as to any actual damage which is to accrue to the ratepayers, unless it be after the undertakings have been transferred to a new authority. We agree with this gentleman so far as to admit that each year will add to the value of the undertakings of the Water Companies, and this is a very good reason, from the ratepayer's point of view, why the bargain should be quickly settled. It should, at the same time, be remembered that this perpetually growing value is an element in the entire calculation, and has its effect on the present market value of the interest which has to be purchased. Mr. Watherston is not far wrong. "The ratepayers have to con-"sider," he says, "whether they or the Companies shall have "the advantage of the unearned profits which, be they large "or small, will accrue to the parties in possession when the "assessment is raised."

All parties may rest assured that should the water supply pass into the hands of a public authority, the Metropolis Valuation Act will afford the basis for the charge to be made upon the occupiers of houses and premises supplied with water. If there be a public rate as well as a domestic rate, or if there be a domestic rate alone, the assessment will in all cases govern the charge, subject again to extra charges in special cases, as at the present time. As a general rule, the annual value of the property is the only practical basis on which to charge for a supply of water. Supply by meter is open to serious sanitary objections; and a charge which is founded on the number of rooms in a house is altogether mediæval and absurd, as shown by the fact that it was long ago discarded by Parliament in favour of the present method. The ratepayer may indulge the hope that when a public authority has possession of the water supply, an increased rateable value in the house property of the Metropolis will not lead to any increased charge. The public authority; it may be said, will rest satisfied with its former revenue, but it remains to be seen whether such a public authority will not be ambitious of "improvements," and whether it will at any time be at a loss for reasons why the rate in the pound should not be kept where it was. "Better this," some will say, "than pay dividends to shareholders." But it does not follow that every addition to the revenue of a Water Company goes to increase the old dividends. Much of it goes to pay dividends on new capital, expended on those improvements which are either forced on the Companies by Local and Imperial Authorities, or which, in the judgment of the Directors, are desirable for the satisfaction of the consumers. It may be that water is dearer now than it was formerly, but it is also much better, and the improvement

is not effected without outlay. When people hear of an intake being removed higher up the river, or a filter-bed enlarged, or a new impounding reservoir constructed, they possibly fail to consider that all this involves the expenditure of fresh capital, for which there must be a return. We are not speaking merely of the extension of the water-works which is rendered necessary by an enlarged demand for water, consequent on the increase of the population. That, at all events, would pay for itself, though it requires fresh capital. But we are adverting to the fact that the works of the London Water Companies, irrespective of the growth of the population, are much more costly now than in years gone by, and unless capital is to be had for nothing, a corresponding rise must take place in the charge for water. To say that there is no equivalent for such extra charge, is to speak in ignorance of the facts. The extra return is apparently found in the increasing rateable value of property, and it is far better for it to be found in this way than in an increased rating on the old assessment. As London grows in wealth it may very properly expend more money in improvements. Local rates do not shrink because the annual value of property goes up. The demands of the Metropolis are growing every year. Something more is wanted, and something better, and the growth of the outlay is found to keep pace, as near as can be, with the means of meeting it.

As a practical comment upon the remarks we have just penned, we would advert to a passage in the last Annual Report of the Local Government Board. We there find it stated by Colonel Bolton that subsequent to the passing of the Act of 1871, the Water Companies have, of their own accord, and in consequence of the recommendations of the Government authorities, incurred and undertaken an expenditure of two millions sterling "for the improvement of the "water supply both in quantity and quality." This, we would observe, can no more be done without payment of dividends by Water Companies than it could be effected without an equivalent in the rates levied by a public authority. It does not follow that a Company will in all cases pay a dividend of seven or ten per cent. on such outlay, though this is the popular notion. But a public authority might be expected to raise money on easier terms than a private company, and in this way the proposed Water Trust ought to effect a saving. The Water Companies are not to be blamed because they have not the power of pledging the municipal rates; but the parties who may have that power in the future ought to be able to show a corresponding pecuniary benefit. If the Metropolitan ratepayers would take a cheerful view of this prospect, they might the more readily reconcile themselves to the Purchase Bill. If the Bill finally falls to the ground, it is threatened by some parties that a competing scheme of supply shall be brought forward. Of all extravagant proposals, this would be the worst—the most hopeless in the first instance, and the most costly supposing the scheme to be put into practical operation. A project of this kind may be planned, but its doom is sealed from the commencement. The special supply proposed by the Metropolitan Board was perhaps the most economical plan that could have been devised; but the project was, nevertheless, felt to be intolerable, and the scheme for a "dual "supply" was decisively rejected as soon as its real nature became understood. What the Companies have most to dread is the introduction of some severe Regulations Bill, designed to operate in such a way as to depreciate their property. But Parliament is not likely to be a party to an obvious trick of this kind. Unfortunately, the whole subject is for the present affected by the element of political strife. The din of a general election is scarcely conducive to a clear judgment on a ministerial measure, even though the latter has reference to a matter which ought to be kept outside the arena of party politics. Mr. Gladstone is candid enough to say that he has not yet had time to examine the measure brought in by Mr. Cross, and therefore he cannot assume "that the Bill is a bad "Bill or a good Bill." But while Mr. Gladstone holds his judgment so far in suspense, he denounces the Government for having brought forward a measure which they fail to uphold. The defence of Mr. Cross is simply that, in respect to this Bill, it was not the intention of the Government "to "force any proposition on Parliament," and perhaps this may be taken as a very fair answer—given by anticipation—to the comment of Mr. Gladstone.

The present Home Secretary, whose general ability cannot be questioned, has thus learned of late, more fully than ever, how enormously difficult it is to satisfy the Metropolitan ratepayer, or those who venture to speak on his behalf. Yet it is not at all unlikely that if the present Bill fails to reappear in the next Parliament, there will be a general feeling that a good opportunity for placing a great Metropolitan question on a new basis has been needlessly sacrificed. If the Bill really dies, it will have a fair epitaph, and we shall hear of its virtues when it is too late to benefit by them.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

THE USE OF THE FOUR-BUSHEL MEASURE IN THE SALE OF COKE.

SIR,—In the JOURNAL of the 9th inst., page 365, alluding to the new coke measure, you state as follows:—"The only variation that is now necessary in the coke business is one of terms. The quotation of chaldron must be dropped, and 12 four-bushel measures substituted."

Allow me to ask why you state 12 four-bushel measures. Why not 9 four-bushel measures, equivalent to the chaldron of 36 bushels? A sack being 3 bushels, 12 sacks would be equal to 36 bushels.

Gas Office, Deal, March 11, 1880. W. R. HAMMOND.

[The suggestion that "12 four-bushel measures" should in future be quoted, was made because of the evident convenience its adoption would be to the coke trade—indeed, in it lies the whole question. Nine sacks equal to 36 bushels would, it is true, constitute the new "chaldron;" but in bulk would be 25 per cent. less than the quantity hitherto comprising a chaldron. This is the very confusion which was sought to be avoided, and the suggestion referred to sets the matter straight.—ED. J. G. L.]

THE ELECTRIC LIGHT IN AMERICA.—In the course of a letter, dated this day month, from Major G. Warren Dresser, Editor of the *American Gaslight Journal*, he says: "We still live, and are patiently waiting for some new *furore* on electric light, or something else. As it is, Mr. Edison has not yet established himself in New York, and the public are obliged to suffer the infliction of gas companies with their horrid bills, &c., &c. At various points in the city an electric light may be seen hung out from the top of a high building, as a sign that something or somebody is to be sold within. The practical applications in this city for any other than advertising purposes are very few. In some of the mills in New England the "Brush" light has been introduced with very good practical results. In fact, Mr. Brush has, I think, done more and better practical work with his system than any of the other American inventors. But their statements of cost of running may be taken *cum grano salis*, and I know of one case at least where this light is used quite extensively, in which the mill proprietors who use the light do not hesitate to buy gas stock in the Company supplying their town, when they get a chance. The statement that the electric light saved them several thousand dollars a year does not seem to be borne out by the fact that their gas bills for six months, while using the electric light, did not vary a hundred dollars from the corresponding six months when not using it."

ABINGDON GAS COMPANY.—The seventeenth annual meeting of this Company was held on Thursday, the 4th inst.—Mr. E. S. Copeland in the chair—when the Directors reported that the balance of net profit for the past year amounted to £1387 11s. 9d. They recommended a dividend of 10 per cent. on the original shares, and 7 per cent. on the B shares, which would absorb £1047 14s. 2d., leaving £339 17s. 7d. to carry forward. During the year there was sold by auction £1000 of new capital. This realized a premium of £115 12s. 9d., which has been applied to reducing the cost of extensions. The Directors stated that they have reason to believe that the new system of charging retorts adopted by their Manager (Mr. John Ely) has greatly contributed to the increased make of gas per ton of coal carbonized during the last twelve months. The Company have issued £10,000 of 10 per cent., and £1500 of 7 per cent. capital; and have borrowed £3000 at 5 per cent. The unexpended capital amounts to £1230. The receipts for the year—including £2651 8s. 6d. from the sale of 10,605,700 cubic feet of gas at 5s. per 1000 feet; and £410 10s. for public lighting and under contracts—amounted to £4027, and the expenditure to £2622. The report was adopted, and the dividends agreed to. Votes of thanks were passed to the Chairman and Mr. Ely at the close of the meeting.

DOUGLAS (ISLE OF MAN) GASLIGHT COMPANY.—The ninetieth half-yearly meeting of this Company was held on Monday, the 23rd ult., when the Directors reported that the net profits for the half year ending Dec. 31, amounted to £2289 15s. 2½d. The profit, notwithstanding the reduction in the price of gas made on the 1st of July last, exceeded that of the corresponding period of 1878 by £115 10s. 3½d.; and the increase would have been considerably more, had not the reduction affected the full six months, while in 1878 the reduction then made affected only the three months from October to December. The Directors stated that the consumption of gas throughout the town showed a marked increase, as compared with the corresponding period of 1878. The quarter ending the 30th of September showed an increase of 10 per cent., and the quarter ending the 31st of December an increase of 16½ per cent. During the current half year the Directors would be compelled to make large and important additions to the general working plant. New condensers and scrubbers would have to be erected, and a new station-meter, as the present one was too small for the make of gas, and, therefore, unreliable in its registration. These extensions to plant it is estimated will cost about £2000. The Directors have made a contract for the renewal of two sets of retorts during the spring. Respecting the building of a new gasholder and tank, the Directors reported that the concrete tank had been completed; but, acting under the advice of Messrs. C. and W. Walker, the contractors, the Directors had deferred erecting the holder until the spring opens. At the meeting of the Company held last August, it may be remembered the Directors informed the Shareholders that they would consider their interest with respect to the extension of the working plant made out of profits. They now recommended that a bonus of one-fifth of a share be allotted to each Shareholder; and that the dividend for the half year be £1 5s. per share. These recommendations were agreed to; after which a vote of thanks was passed to the Directors, and acknowledged by Mr. Naylor, who, in turn, proposed a vote of thanks to the Secretary, Manager, and the general staff of servants of the Company. Mr. Goldsmith seconded the motion, which was carried unanimously. Mr. Quinney (the Secretary) and Mr. Smith (the Manager) having returned thanks, the proceedings closed with a vote of thanks to the Chairman.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, MARCH 8.

The Select Committee on the Cardiff Water Bill reported that they had not proceeded with its consideration, no parties having appeared in opposition.

TUESDAY, MARCH 9.

METROPOLITAN WATER-RATES.

The Earl of CAMPERDOWN gave notice that he will this evening call attention to the present position of the metropolitan ratepayers who consume water, with reference to the charges which are and may be made by the Water Companies; and ask whether the Government will take steps to ascertain—(1) if the Companies are correct in law in interpreting "annual value" to mean "gross annual value;" and (2) if each successive re-valuation of the Metropolis under the Metropolis Valuation Act, 1869, will alter the rateable valuation of metropolitan property in respect of the water supplied by the Companies.

FRIDAY, MARCH 12.

A petition against the Rathmines and Rathgar Township (Vartry Water Supply) Bill was presented from the Grand Canal Company.

HOUSE OF COMMONS.

MONDAY, MARCH 8.

METROPOLIS WATER-WORKS PURCHASE BILL.

The CHANCELLOR of the EXCHEQUER having made a statement to the House as to the early dissolution of the present Parliament, and mentioned what Government business would have to be got through,

Sir CHARLES DILKE said: The right honourable gentleman did not mention one very important measure which has been introduced by the Government—I mean the Metropolis Water-Works Purchase Bill. Some people seemed to think that this Bill was the subject on which Government were likely to dissolve, and therefore it would be desirable to know what is to be done with it.

Mr. CROSS: The honourable baronet must know perfectly well that I stated the other night that as far as any bargain with the London Water Companies was concerned, it was never the intention of the Government, in any form or shape, to force the bargain they had made upon the public. The only proposition which the Government has ever made in regard to the matter is this—that a measure should be introduced into the House and go before a Hybrid Committee, and if the Committee or the House thought the bargain would not be a beneficial one, there would then, of course, be an end to it. There was no intention on the part of the Government to force any proposition on Parliament.

PRIVATE BILLS AND THE IMPENDING DISSOLUTION.

Sir J. GOLDSMID subsequently said: I suppose the Chancellor of the Exchequer has considered the question with regard to private Bills which have been introduced. Some of the parties to those Bills will have been put to considerable trouble and expense.

The CHANCELLOR of the EXCHEQUER: It is a common practice, whenever there is a dissolution of Parliament in the spring, to pass a Standing Order which puts private Bills at the beginning of a new Parliament in the same position which they occupied in the old one.

TUESDAY, MARCH 9.

The Standing Orders Committee reported that, in the case of the Rathmines and Rathgar Township (Vartry Water Supply) Bill (Lords), the Standing Orders ought to be dispensed with, and the parties allowed to proceed.

A petition in favour of the Hull Lighting Bill was presented from the Corporation of the Governor, Deputy-Governor, Assistant, and Guardians of the Poor of Kingston-upon-Hull.

The *locus standi* of the Midland Railway Company as petitioners against the Liverpool United Gas Bill was disallowed.

METROPOLIS WATER-WORKS PURCHASE BILL.

Mr. SAMUELSON asked the Secretary of State for the Home Department whether, before concluding his negotiations with the London Water Companies, he obtained reports and estimates, from competent Engineers, of the probable cost of extra works (if any) required to give an adequate constant supply of pure water, on the transfer of the various undertakings; a similar estimate for works having the same object, during the period covered by the proposed payments of deferred stock; and a report and estimate of the cost of establishing entirely new works adequate to afford such a supply over the area served by the existing Companies; and, if such reports and estimates had been obtained, whether he would lay them upon the table.

Mr. CROSS: Of course all these questions were matters which had to be very carefully considered, and if the Bill had gone into committee, I should then have been prepared with evidence to show actually what would have been the cost and expense of these matters. This evidence is not in a form to be laid on the table, nor at this time, in the present state of affairs, do I think it would be conducive to the public interest that it should be laid on the table; but whenever the Bill gets, if it does ever get, into committee, I will take care that these matters shall be laid before it.

Alderman COTTON asked whether it would not be better to withdraw the Bill at once, seeing that there was not any chance of its being passed before the dissolution of the present Parliament.

Mr. CROSS: I thought I explained last night, in answer to a question put by the honourable baronet, the member for Chelsea (Sir C. Dilke), that the Bill would not appear on the paper again this session. At present the public are not willing to pay the price for which alone at present the Companies are willing to sell, and so ends the matter. I wish, with the permission of the House, to correct two errors which appear to prevail as to what I said on two points connected with the Bill. First, I am reported to have said that there would be a saving of £50,000 in the year 1880–81 from the consolidation of the staff of the Companies and engineering operations. What I meant, and what I believe I did say, was that there would be a saving of £50,000, owing to the basis on which the income of the Companies for that year was calculated and the abolition of Directors fees, besides any saving from the consolidation of the staff and engineering operations, which matter has been variously computed at from £75,000 to £100,000. Secondly, as to the impression which apparently prevails from what I stated that the ratepayers would not be consulted, I do not understand how this matter could at all have got abroad. The whole object and end of the Bill was that the ratepayers should have every opportunity of pressing their views upon the Committee for the rejection of the Bill if they thought it would not be a beneficial bargain to make, and should the matter again come forward the ratepayers may rest assured that they will be duly consulted, and will have ample opportunity for stating their views on the subject.

Mr. GOSCHEN: May I ask a question also of the right honourable gentleman with regard to this Bill. It is, whether any steps could be taken, before any further legislation takes place with regard to the London Water Companies, to prevent any alteration of the relative positions of these Companies and the public in the interval. I mean, for instance, precautions that the Companies should not again raise their rates upon the public upon the next re-valuation, and then make that raising of the rates a further argument for an increase of the price when fresh negotiations are opened. I would ask the right honourable gentleman whether he can state anything now to the House, or whether he would on Thursday be able to make a statement, as to whether it is possible, by a short clause, or by any other means, to endeavour to maintain the *status quo* of the Companies.

Mr. CROSS: If the right honourable gentleman will ask that question on Thursday, I will be prepared to answer it.

WEDNESDAY, MARCH 10.

The return which Sir CHARLES DILKE, on Friday, the 5th inst., gave notice that he would move for, in reference to the Metropolis Water-Works Purchase Bill, was ordered.

THURSDAY, MARCH 11.

PRIVATE BILLS AND THE IMPENDING DISSOLUTION

Mr. RAIKES (Chairman of Ways and Means) proposed a series of resolutions, which were adopted as Standing Orders of the House, empowering the promoters of private Bills in this session of Parliament to introduce their Bills into the next Parliament at the stage they last reached in the present one.

METROPOLIS WATER-WORKS PURCHASE BILL.

The Examiners report, that the Standing Orders have been complied with in respect to this Bill, was presented.

METROPOLITAN WATER-RATES.

Mr. GOSCHEN had given notice to ask the Secretary of State for the Home Department whether he had considered the possibility of taking steps, by a Bill or otherwise, to prevent the Water Companies in the Metropolis from further raising their rates to the consumers on the strength of existing Acts of Parliament, pending further legislation on the subject. He added: Perhaps the House will allow me to explain what I mean when I speak of "existing Acts of Parliament." I am thinking of the Metropolis Valuation Act, 1869, under which the Water Companies raise their rates, but which certainly was not intended, either by the framers of the Act or by Parliament, to have that effect. It was not intended to meet the case of the London Water Companies at all.

Mr. CROSS: I was not aware, until the right honourable gentleman explained what the question was, whether he referred to the Metropolis Valuation Act, or to the Metropolis Local Management Act and the private Acts which regulate each Company. There can be no doubt that the Metropolis Valuation Act, which I am bound to say was a very useful measure, was passed for the purpose of getting a proper valuation of the Metropolis for the special purposes named in that Act of Parliament. There can equally be no doubt that, in considering what the annual value of the property supplied by the Water Companies was, they did take advantage of the Act, and when it was passed they did raise their rents considerably. Parliament took no notice of this matter, and it has gone on up to the present time. The water-rents, however, are not determined by statute, but by the Companies own Acts, and in the event of any dispute as to what really is the annual value of premises, the consumer has the same remedy as before the passing of the Act, by going before two justices. In the case of any Company—either railway, gas, or water works—where there has been a price fixed, or anything of that kind, Parliament never alters the price so fixed unless the Company applies for further parliamentary powers and the House assents. In the particular case of the Southwark and Vauxhall Water Company, they are at present applying for further powers, and the House may depend upon it I will take great care and ample precaution that they shall not have any additional rates; and I am also prepared to state this, that if I find on the part of any of the Companies any action for raising their rents for the purpose of enhancing the price to be paid for compensation, I for one shall certainly advise Parliament to pay no attention to the matter.

Legal Intelligence.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

THURSDAY, FEB. 4.

(*Before Lord* COLERIDGE, *and Lords Justices* BRAMWELL *and* BAGGALLAY.)

IN THE MATTER OF THE ARBITRATION BETWEEN THE BIRMINGHAM CORPORATION AND THE WEST BROMWICH IMPROVEMENT COMMISSIONERS.

Sir HENRY JAMES, Q.C., and Mr. MICHAEL appeared for the appellants; Mr. H. MATHEWS, Q.C., Mr. R. E. WEBSTER, Q.C., and Mr. PEMBROKE STEPHENS for the respondents.

Sir HENRY JAMES, in opening the case for the appellants, said this was an appeal from a judgment delivered in the Queen's Bench Division on the 29th of May last [see JOURNAL, Vol. XXXIII., p. 895], by which a rule *nisi* for setting aside an award was discharged. The award was made by an Umpire (Sir Henry Hunt) and two Arbitrators, the question in dispute being the legal construction of certain statutes. By an Act of 1845, the Birmingham and Staffordshire Gas Company were formed, but it would be convenient throughout the argument to call this the Staffordshire Company, as there was another Birmingham Gas Company. By section 194 of that Act, power was given to the Company to sell the undertaking to the Birmingham Corporation. Subsequent Acts were passed in 1858 and 1864, but the original Act having been incorporated with them, they were all to be treated as one Act. The total capital of the Company was £670,000. Upon £320,000 of this sum there was a limit of 10 per cent. as to dividend, and on the remaining £350,000 a limit of 7½ per cent. The maximum price to be charged for gas was 4s. per 1000 cubic feet. Nothing seemed to have been done under the selling power of the Act until an agreement was entered into in 1874, by which the Corporation became the purchasers of everything belonging to the Staffordshire Company. Except for the purpose of raising money, he did not think it was necessary to have parliamentary sanction to this agreement; but it so happened that at the same time the Corporation were entering into negotiations for the purchase of the undertaking of the other Company—the Birmingham Gas Company—for which it was necessary to apply to Parliament, and the two things were combined in one Bill. By virtue of the Act of 1875 the purchase was carried into effect. The supply of gas was given first to Birmingham proper, and then to certain districts, twelve in number. There were three gas-works—two in Birmingham, and one called the Swan Village works—belonging to the Staffordshire Gas Company, and supplying, among other places, West Bromwich. By section 34 of the Act of 1875 the price to be charged for gas by the Corporation outside the borough of Birmingham, except in certain specified places, was to be the same as for the time being was charged within the borough.

Section 36 of the Act regulated the application by the Corporation of the moneys received from the sale of gas, and among other things it was enacted that they should, from time to time, carry to the borough improvement rate or fund the net surplus remaining after the fulfilment of their other duties. The most important section in the present case, however, was the 40th, which enacted that if any local or sanitary authority within the limits of supply of the Staffordshire Company should bring in a Bill during the two succeeding sessions of Parliament for the purchase of their portion of the gas undertaking, the Corporation should not oppose the application to Parliament except on clauses; and if the local or sanitary authority gave notice of their intention to purchase within two months of the passing of such Act, the price to be paid should be settled by arbitration, and one such arbitration should settle the principle of valuation as between the Corporation and any other authorities within the limits of supply. At the time when the Bill of 1875 was promoted, certain of the outlying districts, of which West Bromwich was one, opposed the Bill, and clause 40 was evidently inserted with two objects—one being to give the outlying districts the right to separate existence in respect to the supply of gas to their own consumers, and the second to prevent the necessity of having twelve separate arbitrations. The Birmingham Corporation had become the supplying Authority to all the districts, and the districts had derived from the Corporation management the benefit of a reduction in the price of gas to 2s. 7d. per 1000 feet, whereas the Staffordshire Company charged 3s. 3d. per 1000 feet. Notwithstanding this reduction, there was a margin of profit to be carried to the credit of the borough improvement-rate. West Bromwich took the lead in seeking to carry into effect the powers given by section 40 of the Act. Other districts appeared, as they were entitled to, at the arbitration, in order to obtain a declaration of the principle of valuation. Sir Henry Hunt was the Umpire, and Mr. F. J. Bramwell and Mr. T. Hawksley were the Arbitrators. There was a difference of opinion between the Arbitrators, and Sir Henry Hunt made his award, against which a rule *nisi* was obtained in the Queen's Bench Division. The amount of the award was £70,750. If the award had stopped there, however inadequate this sum might have appeared to the Corporation, of course no objection could be taken to it; but it so happened that in performing the second duty cast upon him, the Umpire disclosed how he arrived at the amount. It appeared that he arrived at it, not by the exercise of wrong discretion, but by dealing with the subject matter of the award as being one thing, whereas it was another. If it could be proved that this was so, there would be good ground for setting aside the award. His contention would be, first, that the Umpire had not stated a principle of valuation; and, secondly, that he had shown that he was mistaken as to the subject matter. He had given compensation for one thing, whereas he ought to have given it for another. The words of the award were: "I determine the principle of valuation to be as follows:—The sum fixed is the value to the seller at the date of the service of the notice to purchase, and the subject matter of purchase is the portion within the district of the purchasing body (with any exception or modification contained in the Special Act) of the undertaking late of the Staffordshire Company, as purchased by the Birmingham Corporation under the Act of 1875, unenhanced by the advantages resulting from the purchase by the Corporation under the Act of 1875 of that undertaking and the undertaking of the Birmingham Gas Company, or either of them, or by the consequences attached by that Act to the said undertaking." The Umpire, therefore, regarded the subject matter as the gas-works as they existed at the time of the notice to treat, less any value that might have accrued to them between the year 1875 and the notice to treat. The part of the award dealing with the principle of valuation was: "The value of the distributive plant purchased must be ascertained. To this must be added the value of the goodwill or exclusive right of supply of gas within the district. This may be ascertained by taking the relative proportion between the whole quantity of gas which, at the date of the notice to purchase, would have been sold by the undertaking late of the Staffordshire Gas Company, as purchased by the Corporation under the Act of 1875, and the quantity which at the same date would have been sold within the district of the purchasing body (the probable prospective increase in the quantity sold being taken into account), adjusted with reference to any special circumstances affecting the value of the right to supply within such district. The value of any extensions and additions must be added, and the value of mains retained by the Corporation deducted. No allowance should be made for compulsory sale." The only thing that was done towards laying down a principle of valuation, therefore, was that the Umpire said: "You are to take the whole quantity of gas which has been sold by the undertaking, and then you are to take the whole quantity sold in the district;" but he was quite silent about what was to be done with those two quantities, what deduction was to be made from them, or what comparison was to be made between them. He seemed to have made a rule-of-three sum with two quantities only.

Lord Justice BRAMWELL: You applied to the Queen's Bench Division to set this aside. What is their jurisdiction?

Sir H. JAMES said he thought the application was made under a statute of William and Mary. It was made a rule of court. The arbitration was under the Companies Clauses Act. His lordship would recollect that by the Act of 1845 power was given to the Corporation to purchase, and to the Staffordshire Company to sell only to the Corporation. The Corporation, therefore, not only had the right to purchase, but the only right.

Lord Justice BRAMWELL: Supposing we did agree with the arbitration so far as it fixes the price to be paid to you by the West Bromwich people, have we the right to interfere with the principle of the arbitration?

Sir H. JAMES said the Court had that right. Under the Act of 1875 the outlying districts were not entitled to take any part of the Swan Village works, because those works would be required to supply Birmingham proper, neither were they entitled to take any portion of the mains, or the means of carrying the gas, unless those mains supplied their districts only. Therefore the subject of purchase became a peculiar one. It was not a case of the ordinary purchase of gas-works, which could be settled in an easy way—namely, by finding the profit made by the gas company, and multiplying it by a certain number of years purchase; but only a portion of the Birmingham undertaking was to be taken over.

Lord Justice BRAMWELL: Was the manufactory in the West Bromwich district?

Sir H. JAMES said that it was, but they were not bound to give it over, because it was wanted for Birmingham proper as well as for other districts. The reason West Bromwich did not take it was that it was much larger than would be required for their district; it would have been a white elephant to them. Therefore, in settling the compensation, a certain amount had to be deducted from what otherwise would be paid by the purchasing authority. It was a difficult matter, no doubt, because there were different interests in relation to different districts; but, so far as one principle could be applied to all the districts, the first arbitration was to find it. The Court below had laid it down that the Birmingham Corporation, and all other governing bodies which became gas owners, had no right to make any profit at all, and that they were bound to make an exact return between the sum they received and the sum they expended, so far as human power could produce that result. If a profit existed, it must be by force of accident, and not by force of intention. The Public Health Act of 1875 first gave governing bodies the power to supply gas, and a great many large towns had since that date availed themselves of the permission. Within the past four years 21 of these towns had made a profit of over £1,000,000, and applied it to the borough rates; but the decision of the Queen's Bench was that this money had been illegally taken, and that the price charged for gas should always be reduced, so as to make an equality between the amount received and the amount expended. If the principle of valuation was a matter of pure discretion for the Umpire, he (Sir H. James) did not think he could attempt to set the award aside; but it was the Umpire's duty to arrive at a principle of valuation, and he had not arrived at one. Therefore his duty had not been fulfilled, and on that ground the award would be bad. There was, of course, a great distinction between the supply of water and the supply of gas. In most general Acts referring to water supply there was a statement that the supplying body, being the governing body, should not make any profit; but this restriction did not exist with regard to the supply of gas, probably for the reason that water was a necessity, and the Legislature were anxious that nothing should be done to prevent everybody having a good supply. Gas, however, was not such a necessity. It was contended on the part of the Corporation of Birmingham that the duty of the Umpire was to take the value of that which West Bromwich was obtaining at the date of the notice to treat—viz., the 16th of August, 1876. At that time the Corporation had the Staffordshire Company's works in their hands. It was the duty of the Umpire to look at the value of the thing in the hands of the Corporation, and in one sense he had done so; but it was contended on the part of the West Bromwich Improvement Commissioners that this was not his duty—that he was to look, in point of time, at the date of the notice to treat, and to look at the value of the thing obtained by West Bromwich at the date of the notice to buy, but he was to treat that which was taken by West Bromwich as if it were not in the hands of the Corporation, but as if it had remained in the hands of the Staffordshire Company. This meant that he was to add to or take away from its value all incidents which would have existed if the Staffordshire Company had retained possession of the works, and to remove from its value all incidents which had existed by the fact of the Corporation coming into possession. What the Umpire said was, "I have not taken the value of that which has gone to West Bromwich at the time of the notice to treat, but I have substituted for it another thing." The Corporation of Birmingham presented this view—that it was the Umpire's duty to look at the value of that which was conveyed to West Bromwich at the time of the notice to treat—that he must look at it as a thing of value existing in the hands of the Corporation, and consider what was its value to the seller, and that would be the value the purchaser must pay. The Umpire had *primâ facie* found that this was the duty cast upon him; but West Bromwich had taken another view, and said, "You are bound to look at the value of something else. You are not to take that which is given to West Bromwich as being in the hands of the Birmingham Corporation; you are not to take it with its incidents of value, but you are to treat it as if the Staffordshire Company had remained in existence, and as if all the advantages which had been brought into it by the Birmingham Corporation had never existed. You are thus to arrive at its real value in the hands of the seller, supposing, theoretically and constructively, deductions in consequence of its remaining with a body which at that time had ceased to exist."

Lord Justice BRAMWELL: Suppose the Birmingham works were worth £100,000 to them, and suppose they gave £100,000 for the Staffordshire works; suppose when they had the two they were together worth £200,000 each to them; West Bromwich says, "I do not care about that; you must sell me what I want of the Staffordshire works upon the footing that they are worth £100,000, although the Birmingham property would be diminished in value to the extent of £100,000."

Lord COLERIDGE: Does it come to the question as to whether the Birmingham Corporation have a right to make a profit?

Sir H. JAMES said substantially it did, because one of the enhancing incidents was that there had been an increase in value in the hands of the Birmingham Corporation. The view of the Queen's Bench was, "You gave to the Staffordshire Company the exact value of that which you bought, you have no business to say, 'This is of a certain value to us as a Corporation, because we are able to obtain so much profit;' you ought never to have made any profit."

Lord Justice BRAMWELL: Supposing you put the two concerns together, and could sell your gas, say, at 2s. 6d. per 1000 feet; suppose these people take away from you what they want, and you are obliged to sell your gas at 3s. per 1000, then the Corporation and ratepayers of Birmingham lose 6d. upon every 1000 feet of gas. Why?

Sir H. JAMES said he could not answer that.

Lord Justice BRAMWELL said the Corporation and ratepayers might say they did not want to make a profit, but they objected to being unable to sell their gas at as low a price as they did before.

Sir H. JAMES said if the district supplied were diminished, there would be an absolute loss to Birmingham. Of course his friend's view was specifically that it was not a compensating price—that when the Act of 1875 was passed the Legislature intended that what was termed the supply should be divided, and that there should be an express declaration that the buying local authorities should not pay a compensating price, but should take the standard of value of the thing as it was in the hands of the Staffordshire Company.

Lord Justice BAGGALLAY asked if the provisions of the Act of Parliament in any way modified the provisions of the 40th section.

Sir H. JAMES said they did not in any way. The bulk of the argument must rest on the 40th section. His contention was that this was in the first instance an ordinary case of sale and purchase, and that unless something could be found that would destroy the general principles controlling such sale and purchase, the Umpire must look at the value to the seller, at the date of the notice to treat, of the thing sold, and if that was taken away from the seller by compulsory powers he must be compensated for his loss.

Lord Justice BRAMWELL: Is it worth while for the West Bromwich people to pay this sum of money for it? If it is, they ought to pay you; if it is not, they ought not to buy it.

Sir H. JAMES said West Bromwich had already obtained the advantages of the provisions of the Act of 1875. The Birmingham Corporation had reduced the price of the gas in consequence of that Act, and West Bromwich not being subject to the infliction of rates by the Birmingham Corporation, they had absolutely gained by the Birmingham Corporation acquiring the two undertakings. Having obtained that advantage, they now declined to remain as they were. They wanted to have a portion of the undertaking in their own hands, and yet they would not pay the value it possessed to the Birmingham Corporation.

Lord Justice BRAMWELL: Suppose a man buys two separate carriage horses for 100 guineas each, and they make an admirable pair for which he could get 300 guineas, and somebody claims to buy one at 100 guineas; is that an illustration?

Sir H. JAMES said it was. Unless there was some statutory enactment

to the effect, the principle which he had mentioned must prevail, that no deductions should be made from the value of that which was conveyed from the seller to the purchaser at the date of the notice to treat. In the present case the Umpire had made some deduction, and he must show that that deduction was rightly and legally made. He had no fountain to go to from which to draw any right to make such a deduction, except the Act. It was for his learned friend to show where such a power could be found within the terms of the Act, to enable the Umpire to make the deduction. The Umpire had to determine the principle of valuation, but he had no right to determine the subject matter. That which was the principle of valuation or the mode of valuation was perfectly distinct from the subject matter that had to be valued, and it was beyond the strength and power of the Umpire to determine what the subject matter of the valuation was. He had no more right to alter the subject matter than a surveyor had to value two houses when he was only instructed to value one.

Lord Justice BRAMWELL: You mean if the Act of Parliament provided that the Umpire should value as from the 1st of August, 1875, and on the face of his award he showed that he had valued as from the 1st of August, 1876, then he would not have valued that which he was told to value.

Sir H. JAMES said that was his view.

Lord COLERIDGE: Take it the other way—that what he has to value is at the date of August, 1876, but he really values, as appears on the face of the award, at the 1st of August, 1875, and says, "I have done that upon this principle, that I consider the difference in value between the 1st of August, 1875, and the 1st of August, 1876, ought not to be taken into account."

Sir H. JAMES said if the statute in the case enacted that he should value as from the 1st of August, 1876, then he would not have valued the right subject matter.

Lord COLERIDGE asked if it might not be called a principle of valuation, that all which had been added to the subject matter within twelve months of the notice to treat was, in the Umpire's view, something which ought to be entirely rejected.

Sir H. JAMES said this was not a principle or mode of valuation; it was the valuation of something distinct from that which the Umpire was told to value.

FRIDAY, MARCH 5.

Sir H. JAMES continued his address on behalf of the appellants. He contended from the Acts that what had been made over to the West Bromwich Commissioners was not only that which had been in the hands of the Staffordshire Company without enhancement of value by anything that had been effected by the Birmingham Corporation, but whatever the Birmingham Corporation had done, whatever they had secured by way of advantage was to be made over to the West Bromwich Improvement Commissioners. The contention of the West Bromwich Commissioners was, "True, you, the Birmingham Corporation, brought capital to bear in producing the state of things which causes gas to be cheaper; yet we will not pay for it." Suppose the Umpire said, "I will look at the value of that which is the subject matter physically at the time at which it was valued in 1830, when the district was much less than it is now;" he had no right at all to say this, because it was not the mode or principle of valuation.

Lord Justice BRAMWELL: The word "right" is equivocal. If "right" means power, he had the right to do it.

Sir H. JAMES said it was not within the discretion of the Umpire to say what concessions were to be made to the purchaser. Suppose he had said, "I think the value of these works is £70,000, but I choose to say they are only worth £30,000," he had no right to do that. He could not take off a discount, as it were; he must perform his duty according as the statute had told him to perform it. He had to determine the sale; he had to value that which was there, and not take off anything.

Lord COLERIDGE: He has to value what is there, but he is to value it as between an ascertained purchaser and an ascertained buyer.

Sir H. JAMES said it was to be purchased according to the terms of the 40th section of the Act. He would submit that it was for his friend to show, on the part of West Bromwich, why the ordinary rule or mode of ascertaining the subject matter of the compensation did not apply here, and why the Umpire had a right to say, "I will take something off that which I have valued." He (Sir H. James) did not for a moment contend that the appellants had a right to interfere with the manner in which the Umpire arrived at the value. He could give numerous instances by which the Umpire could arrive at the value in a certain way, but the objection he (Sir H. James) was taking was that the Umpire had admittedly not valued that which was put into the hands of the West Bromwich Commissioners, but had said, "Instead of valuing that which you, West Bromwich, will take, I will value that which, although you do take it, I will suppose you have not got. Then I will suppose it is in a different condition from that in which you do take it." Supposing a man valued a house, and it was in good repair, what right had he to say, "I will not value it as in good repair, but I will value it as if the top storey was off—as if it had no roof on it."

Lord COLERIDGE: Supposing a vendor buys a house by Act of Parliament, with a note in the Act that somebody shall have a right of compulsory entrance in two years. In this case the Corporation of Birmingham buy by Act of Parliament, and there is a note that in two years certain portions may, according to the Act, be taken from them.

Sir H. JAMES: Taking the case of a person buying a house, if there was a note that in two years a person might come in and buy it from him——

Lord COLERIDGE: It might determine the principle of valuation. It might be said, "You may turn this house into a palace."

Sir H. JAMES: Suppose when he bought the house it was in bad repair, and that the person had expended a sum of money in putting it in good repair, or reasonable repair, is he to lose the benefit of that?

Lord COLERIDGE: It is for the arbitrator to say.

Sir H. JAMES said this was not the principle of valuation, because the arbitrator would have to deal with the house as he found it. Supposing that during the period the vendor held it there had been such an extension of a railway, or such a building of houses in the neighbourhood that the house had become of much greater value, was the arbitrator to say, "I will not value the house as it stands; but I will value the house as it would have been if these things had not taken place"? That was not the principle of valuation. It might be that the top storey of the house would be suitable for a conservatory, or something else that would make it peculiarly valuable. The arbitrator only valued a portion of the house, and not the whole of it. In the present case, the Umpire had chosen to value the undertaking when it was a different thing, and when it did not possess the value it then possessed in consequence of what the Corporation had done.

Lord Justice BRAMWELL: You argue that the Umpire has come to an arbitrary, if not an unjust conclusion. You say that he has, in truth, fixed a value upon a different thing. The only way in which you attempt to make that out is this: You say the thing in 1876, when the Umpire published his award, is a different thing from what it was before it was enhanced in value?

Sir H. JAMES: I do.

Lord Justice BRAMWELL: Is it not the same thing? At first it was the thing, afterwards it is the thing enhanced in value. Take the case of a horse. He is of more value when he is entered for races, &c., and suppose a man says, "I will not pay you the enhanced value; the thing is the same."

Sir H. JAMES: It is the same horse, I presume. I will assume that the horse at the time it was valued was well fed and well kept, and a horse of good action. The valuer says, "I shall take that horse as it was a year ago, when it had the glanders, had no action at all, and was on the point of death for want of being properly attended to." No doubt it is the same horse, but it had not formerly the same quantity of flesh on it, or the same amount of blood, or the same action. You have brought it into an entirely different state and condition. It may be the same horse; but it is not the same subject matter of value. Again, if a man is asked to value a sheep, is he to value it according to what it was when it was a lamb? Its value is enhanced by the amount of wool that has grown on it. If a valuer said, "I will value a horse as if it were a foal, and I will value a sheep as if it were a lamb," how could it be said that he valued a horse or a sheep? The duty of the Umpire was to abide by the words of the statute, and I submit that there is nothing to show he had the right to deal with that which was the subject matter of the compensation other than by taking the article at its value as it stood, and looking at it and seeing what value it had. There were peculiar circumstances in this case, and to some extent they were applicable to all the districts. The ordinary circumstances are that the governing body will take over the goodwill, the right to charge on the mains, the manufacturing, and the whole of the gas-works. In this case that would not be done, because none of these districts would be willing to take over the Swan Village works.

Lord Justice BAGGALLAY said that no other authority could acquire this portion of the West Bromwich works, as part of the borough of Birmingham was supplied by them.

Sir H. JAMES said that the nature of things was to let Birmingham proper keep the West Bromwich works. In this case there were special circumstances. They could not give over the means of producing the gas. That ought to be kept by the selling body, and, therefore, a new principle had come into operation. He contended that, on the face of the award, there had not been a valuation of the whole subject matter. This portion of the argument narrowed itself down to the small question, "Has the Umpire or has he not valued that which was the subject matter?" They had to look at what existed in the statute, to see whether that which had been deducted could rightly be deducted from the subject matter, and then they came to the more debateable ground, "Is it deducted from the subject matter, or is it simply a method, or mode, or principle of valuation?" First, was this a deduction from the subject matter? In the first place, the Umpire began by saying the subject matter of purchase was so-and-so, and, of course, the subject matter of purchase was identical with his valuation. If he had chosen to say, "I do not value that which is before me, but I value it unenhanced by something that has been added to it," was not that word "unenhanced" identical with the words "deducted from"? Then he would say, "Having deducted that from it, I value it *minus* that which is there now existing." Was that a principle of deduction, or was it not a dealing with the subject matter? Then the Umpire began to arrive at the principle of valuation, but it was not very clearly mentioned. He said, "The value of distributive plant must be ascertained. To this must be added the value of the goodwill or the exclusive right of the supply of gas within the district." In one sense that was principle, and in another sense it was subject matter. The Umpire then proceeded to give the principle of valuation. "This," he said, "may be ascertained by taking the relative proportion between the whole quantity of gas which, at the date of the notice to purchase, would have been sold by the undertaking late of the Staffordshire Gas Company, as purchased by the Corporation under the Act of 1875, and the quantity which at the same date would have been sold within the district of the purchasing body (the probable prospective increase in the quantity sold being taken into account), adjusted with reference to any special circumstances affecting the value of the right to supply within such district." What was to be done with these two things the Umpire did not say. Two things were to be taken—namely, the proportion between the whole quantity of gas in the whole district, and that which was sold within the particular district taken.

Lord Justice BAGGALLAY: There are the words "relative proportion." You are taking into consideration the whole amount and the relative proportion of what is supplied in each particular district and what is supplied in the whole.

Sir H. JAMES: What is the proportion?

Lord Justice BAGGALLAY: He is ascertaining as a valuer the value of the goodwill of the business. He says, "I shall not take the proportion with reference to this district alone, but I shall take it in proportion to what it bears to the whole." You do not suppose that the Umpire has undertaken, in the principle upon which he acted, to show every detail?

Sir H. JAMES said in many things the Umpire was right enough.

Lord Justice BAGGALLAY: He says, "I shall not take what is the goodwill of the West Bromwich works alone, but I will take what is the fair proportion of it."

Sir H. JAMES said the Umpire had first to find out what was the goodwill of the whole, then he was to take the West Bromwich goodwill, then he had to define the best means of arriving at the West Bromwich goodwill. What had he done? He said, "Take first the whole quantity of gas produced. Go to the books and find the whole quantity—we will say 10 million feet; go to West Bromwich and find out what they are consuming—say 1 million feet. Having found those two quantities, do something." But he had not done anything.

Lord Justice BRAMWELL: What I suppose he means is this: Suppose West Bromwich will take one-tenth of the present production, now find the value of the goodwill of the whole that exists; then as ten is to one, so is the entire value of the whole of the goodwill to the value of West Bromwich.

Sir H. JAMES: If the Umpire had said that, I should not have been here criticizing what he said.

Lord Justice BRAMWELL: How do I find out he said that?

Sir H. JAMES: Your lordship guessed it. What he says is, "Find the goodwill of the whole." If he had done that, I can understand that he would go by the rule of three; but he does not find the goodwill of the whole. All he says is, "Find the gross quantity of gas supplied, and then find the actual quantity supplied to West Bromwich."

Lord Justice BRAMWELL: There is the word "relative." That is a key to it.

Sir H. JAMES: The word "relative" is not sufficient for the finding of the goodwill.

Lord Justice BRAMWELL: What you say he ought to have done is this: This is to be ascertained by taking the goodwill as a whole as it exists, and by taking the relative proportion.

Sir H. JAMES said that if the Umpire had found the goodwill of the

whole, then there would have been great sense in saying, "In order to find the goodwill for West Bromwich, let the proportion of the goodwill be the same as the proportion of the production." [The learned counsel then read the judgment of the Lord Chief Justice in the court below, and argued at some length against the view therein expressed as to the right of a corporation to make any profit out of the sale of gas.]

Mr. MICHAEL did not address their lordships.

After a few minutes consultation, they intimated that they did not consider it necessary to hear the other side.

Lord COLERIDGE said: I am of opinion the judgment of the Court below was right, and must be affirmed. We have to deal with an award made under section 40 of the 38 & 39 Vict., cap. 178, empowering an arbitrator to award, and in the course of his award to determine the principle of valuation for the further and other awards which the section contemplates being made between the Corporation of Birmingham and other purchasers. We have not heard of, and if we had we should not have thought it right to go into the facts as stated in the affidavits, in order to expound either the meaning of this clause in an Act of Parliament, or the meaning of the award framed under the clause. But looking at the Act by itself, it sufficiently appears that various interests were in the contemplation of Parliament when the clause was passed. The Act empowered the Corporation of Birmingham to buy a gas undertaking which had heretofore been carried on by the Staffordshire Company. It appears that in a portion of that undertaking the West Bromwich Local Authority was interested, and that, whether as a matter of compromise or not, the interests of the West Bromwich Local Authority were protected to a certain extent by this 40th section. *Inter alia*, this was provided, that in case the Act passed, and in case the Corporation of Birmingham purchased the large undertaking of the Staffordshire Company, which ranged over a variety of areas, in one of which the West Bromwich Local Authority was concerned, the other Authorities should, if they prosecuted them within two years, have rights as against the Corporation of Birmingham in respect to the purchase of such portions of the works of the Staffordshire Company, taken as a whole by the Corporation, as were within the respective areas of these Local Authorities. They were to purchase them, if possible, by agreement. If agreement failed, they were to purchase them by arbitration, under the Companies Clauses Consolidation Act, 1845. I may say, in passing, that I understand that to be a sufficiently clear parliamentary enactment that the arbitration, as a whole, should be capable of being made a rule of court. If there are, as appears to be the case, any provisions which make this arbitration and award differ from ordinary arbitrations and awards made under the Companies Clauses Consolidation Act, still the true effect of this clause is that the whole award shall be under that Act. Upon this arbitration the Corporation "shall sell, and the Local Authorities shall buy respectively the portion or portions of the undertaking" in the manner before mentioned—that is, they shall buy the respective portions within their local areas. Then some words follow, on which I will make a remark or two: "One such arbitrator shall determine the principle of valuation as between the Corporation and any other Authority or Authorities within the limits aforesaid." That is to say, the arbitrator shall do what, in point of fact, he has purported to do here. He shall not only award the price which is to be paid between the selling and purchasing parties—the Corporation of Birmingham on the one side, and the Local Authorities on the other—but he shall also set out and determine once for all the principle upon which he has arrived at his valuation; or, to put it otherwise, the conditions under or by which the price, as between the vendor and the purchaser, in all these arbitrations, is once for all to be ascertained. And it is to be observed that this is not an ordinary case of determining the principle of valuation between an ordinary vendor and an ordinary purchaser. It is determining what shall be the principle of valuation between a particular and ascertained purchaser from a particular and ascertained vendor of a particular and specific article. What I mean by that is that the Corporation of Birmingham could not sell to anybody except to this particular purchaser, and that this particular purchaser could not purchase anything but a certain specified portion of the whole undertaking. Therefore, it is not the ordinary case of ascertaining principles of valuation between a purchaser and all mankind; but the question to be settled was what is the true principle upon which a person interested in, or who might be interested in a portion of an undertaking which was to go as a whole to the Corporation of Birmingham should pay the Corporation of Birmingham for such part of that whole undertaking as he was interested in, and might within two years desire to buy. If I may say so, I always rather dissent from a tax on the phraseology of Acts of Parliament, knowing how extremely difficult it is, in the conflict of interests, which is keen enough in private Acts of Parliament as well as in public, to get exact, lucid, and clear words which shall express, without raising any further question, all the ideas that are floating in the minds of the parties. Their ideas, perhaps, may not at the time be particularly plain and definite, and the language, therefore, not inadequately represents the ideas present in their minds at the moment when the language was used. Having said this, if we bring a willing mind to the consideration of the 40th section of the Act of 1875, I think that the fair meaning of it is reasonably ascertainable without any very great trouble or much difficulty. Under those circumstances this arbitration takes place, and the West Bromwich Authority, whatever it may be, buys of the Corporation of Birmingham, under the authority of this 40th section, so much of the whole undertaking of the Staffordshire Gas Company as was contained within the local area of which they were the Authority, and which alone they were interested in, and it is referred to Sir Henry Hunt to say what price shall be paid under the Companies Clauses Consolidation Act. He ascertains the price at £70,750. Possibly a great master of style might be able to couch the decision in better language; but bringing, as I say, a willing mind to the construction of the document, it seems to me he has ascertained the principle of valuation with reasonable clearness. He has said this: "£70,750 is what you are to pay to the Corporation of Birmingham, and you are to pay it on this principle. You, the Corporation of Birmingham, have a large undertaking in your hands; it may be, and probably is the fact that between 1875, when the Act was passed, and August, 1878, when my award is made, you, the Corporation of Birmingham, dealing with the advantages you possess, from a variety of reasons, have made that undertaking in your hands worth, as a whole, more than you gave for it." From this expression, "Unenhanced by the advantages resulting from the purchase," &c., I infer that evidence had been given before him that certain advantages had been added to the undertaking between 1875 and 1878. Well, he says, "Looking at this 40th section in the Act of 1875, you, the West Bromwich Local Authority, were given a kind of interest in so much of this whole as was contained within your local area, and you were then given a right to purchase, within a definite time, so much of this whole, which the Corporation of Birmingham could not have obtained the right to purchase except by an Act of Parliament, and to the Corporation's right of purchasing this condition in your favour was appended. I therefore think that the true principle upon which you ought to pay is to ascertain, which I have done, what was the value or what would have been the value in 1875 if you had then been the purchaser from the Staffordshire Company of that portion of their whole which was included in the local area which, having passed to the Corporation, you now have a parliamentary right to purchase upon terms from them. That I have ascertained to be £70,750, and I have done so upon the principle that I have endeavoured to put into plain language." Now, I confess it appears to me to be a sufficiently intelligible principle, and I certainly think that not only am I not prepared to say it was wrong, but, as far as I can judge, it appears to me that it was right, and was a fair and just principle upon which he was to ascertain the valuation. But I go farther, and I think that, supposing the principle to be clearly ascertained, and supposing this to be the meaning of Sir Henry Hunt's award, which I think it is, even if the principle were as wrong as I think it right, and were as unjust as I think it just, it appears to me that, by the 40th section of the Act, the power of so adjudicating has been passed over to him, and that if it is fairly done we have no power to interfere. The only way in which, as it seems to me, this line of judgment could be impugned is the ingenious way in which Sir Henry James has tried to impugn it, and I quite agree that, if I could see that there was a foundation for the manner in which he has put his case, the judgment should be reversed, and the matter sent back to the Umpire. If I have been able to follow Sir Henry James's ingenious argument, it is this: "What the Court below and I have called the principle of valuation, has been miscalled by the Court below and by me. It is not, in truth, the principle of valuation, but a change of the subject matter." Sir Henry James says, in 1875 there was this portion of the undertaking in West Bromwich which the West Bromwich Improvement Commissioners might have had power to purchase from the Staffordshire Company if they had obtained an Act of Parliament. I will assume, for the purpose of Sir Henry James's argument, that if this purchase had taken place of this isolated portion of the whole undertaking in 1875, he would not have disputed that £70,750, or thereabout, would have been a fair price to pay. But, he says, in 1878 the conditions were changed, and that which was merely a portion of a whole in 1875, is now a portion of a whole which has been for three years under very different conditions, and the portion of the whole being now in other hands, and subject to a totally different set of laws, has become in the new hands a very much more valuable thing than it was in the old hands. All the conditions of occupation must be taken into the entity which has been adjudicated upon, and those conditions being incorporated, so to say, into the entity, have changed it, and it turns out that the entity which Sir Henry Hunt would have had to adjudicate upon in 1875 was a different and other entity from that which he had to adjudicate upon in 1878. I do not know whether I have rightly expressed the argument, but what seems to me the answer to it is this, that it is an ingenious mode of stating the case, but it is a fallacious one, because it is really incorporating into the same subject matter not things which make the subject matter itself different, but surrounding circumstances which may possibly have increased the value of the subject matter in the hands which now hold it, but which, as I think, and as Sir Henry Hunt has held, Parliament may have intended to exclude from the consideration of the arbitrator when he had to fix the price between this vendor and this purchaser under this particular 40th section. I think, therefore, it is not correct to say that Sir Henry Hunt has not adjudicated on the right subject matter, as if he had adjudicated on No. 1, Belgrave Square, whereas he had to adjudicate on No. 2. I do not think that this analogy is correct, or that such an argument will bear investigation. It is ingenious and verbal, no doubt; but, after all, the subject matter adjudicated upon is the same, and the principle of valuation ascertained by Sir Henry Hunt is that certain conditions, which may have altered the value of the same thing, are not to be taken into account as between this vendor and this purchaser under this Act of Parliament. The only other matter to which I need advert is that to which Sir Henry James has pointedly called our attention—namely, passages in the judgment of the Court below as to the right of this and other corporations to make profit out of their gas-works. Having already disposed of the case entirely, it is, in my judgment, unnecessary for me to express any opinion whatever, one way or the other, on that matter. Therefore I only say that I neither assent to nor dissent from the expressions used by the Lord Chief Justice in the court below.

Lord Justice BAGGALLAY concurred.

Lord Justice BRAMWELL also concurred. He said, even if the principle was shown to be a bad one, he very much doubted if it would have got rid of the award of the sum named.

The appeal was thereupon dismissed, with costs.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

THE PUBLIC LIGHTING OF THE CITY OF LONDON.

Lieut.-Col. Haywood, Engineer and Surveyor to the Commissioners of Sewers of the City of London, in his report for 1879 says, in reference to street lighting, that tenders were received from the Chartered Gas Company for lighting the public lamps, at £4 13s. 3d. per annum for square-shaped lamps, consuming 5 feet of gas an hour, and £4 17s. 6d. for those of a circular shape; the difference in the cost of the two being in consequence of the additional expense of cleaning and maintaining the latter lanterns. These prices were the same as those paid since 1877. The meters attached to 36 of the public lamps in various parts of the City showed that the full contract quantity of gas was there given; and the Inspectors of Pavements and the Inspector of Gas Lighting were of opinion that the full contract quantity of gas was given at all the lamps, and that the regulators were kept in proper condition by the Company.

As to the experiment with improved gas lanterns and burners in Queen Victoria Street, Mr. Haywood states that, from information and data supplied by the Chartered Gas Company, the general result appeared to be that the improved system of lighting (which was discontinued at the end of last year) gave about four and a half times as much light as the ordinary system, at about three times the cost; but the Commissioners came to no resolution respecting the value of the experiment.

In regard to the electric lighting of the Holborn Viaduct, which was terminated on the 9th of March last year, the report says that the 16 lamps employed in a length of 473 yards—an area of 14,200 superficial yards—of roadway was £5 per night, or 6s. 3d. per lamp. No photometrical observations of the light were made; but, from figures given in the report to the Metropolitan Board of Works upon the electric light on the Thames Embankment, it might be reckoned that the lamps on the Viaduct gave, when unenclosed, about five times the light of ordinary gas-lamps, and when enclosed in opal globes (as they were when in use), twice as much only, and that the actual cost was nearly four times that of gas.

PURTON (WILTS) GAS SUPPLY.—A Gas Company has just been formed at this place, under the Joint-Stock Companies Acts, with a capital of £2000 in £5 shares. The works are to be erected by Messrs. W. C. Holmes and Co., of Huddersfield and London.

EXPERIMENTS IN IMPROVED STREET LIGHTING AT BIRMINGHAM.

On Wednesday last, at the invitation of Mr. Charles Hunt, Engineer of the Birmingham Corporation Gas Department, a number of Gas Engineers, principally from the Midland Counties, and others interested in the subject of improved street lighting by means of gas, assembled at the Windsor Street works of the Corporation, for the purpose of viewing a collection of lanterns and burners of large power which had been got together by Mr. Hunt for the purposes of comparative trials of their efficiency. Among those who were present were Messrs. J. Annan, Wolverhampton; T. Arnold, Borough Surveyor's Office, Birmingham; J. C. Bent, Birmingham; G. Bray, Leeds; T. Collett, Dudley; W. Cross, Leamington; W. Davis, Hereford; J. Deakes, Worcester; A. Dougall, Kidderminster; H. Hack, Saltley; T. Jackson, Birmingham; C. E. Jones, Chesterfield; A. P. Ker, Birmingham; W. King, Liverpool; T. Layton, Redditch; J. Mudie, Burton-on-Trent; W. North, Stourbridge; G. Parker, Oakengates; R. O. Paterson, Cheltenham; J. Peaty, Burslem; H. S. Pike, Hinckley; T. Proud, Birmingham; J. S. Reeves, Bilston; J. Reid, Derby; T. Roberts, Sheffield; P. Simpson, Rugby; S. Y. Shoubridge, Saltley; J. Slocombe, Birmingham; E. Smith, Secretary of the Corporation Gas Department; J. Storer, Stafford; W. Sugg, London; C. Taylor, Derby; J. Tindall, Walsall; W. Winstanley, Newcastle-under-Lyme; H. Woodall, Leeds; J. Wright, Birmingham, &c., &c.

The burners and lanterns were arranged in different parts of the works, the more important ones being placed at distances of about sixty yards from one another on a large tract of unoccupied land to be eventually used for extensions. By this means the effectiveness of the burners was easy of comparison, and much satisfaction was expressed at the completeness of the trials. The following is a list of the burners and lanterns used, showing the consumption of gas by each burner, the illuminating power afforded (when tested in the photometer-room), and the illuminating power obtained per foot of gas consumed :—

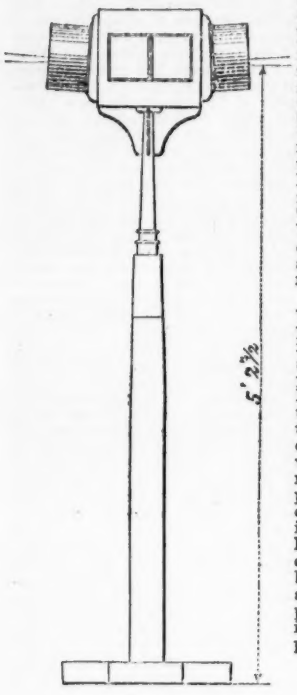


Fig 1.

Fig. 3.

Fig. 4.

No. of Lamp.	Description of Burner.	Description of Lantern.	Consumption of Gas. Cubic Feet per Hour.	Illuminating Power in Candles, tested with 17-Candle Gas.	Illuminating Power per Foot.	Remarks.
1	Bat's-wing	Kitt's, fitted with Reflector	2·5 each burner.	without reflector 4·62 each.	1 85	In direct line with reflectors, 54·4 candles.
2	,,	Collins's Patent ,,	6·0 each burner.	without reflector 16·90 ,,	2 80	
3	,,	Ordinary Street	5·0	14·00 ,,	2·80	
4	Sugg's 80-candle Argand	Sugg's Shadowless	22·8	74·55 ,,	3·26	
5	Bray's 60 ,, Triple Bat's-wing	3 Frosted Globes, 24 in. diameter	26·4 each globe.	85·00 ,,	3·21	These globes diminish the light by 35 p. cent.
6	,, 60 ,, ,, ,,	3 Clear ,, ,, ,,	24·0 each globe.	73·00 ,,	3·04	
7	Sugg's 100 ,, Argand	3 Opal Top ,, 30 in. diameter	27·0	101·70 ,,	3·77	
8	,, 80 ,, ,,	1 ,, ,, 26 in. diameter	23·4	79·87 ,,	3·41	
9	,, 200 ,, ,,	1 ,, ,,	45·6	180·20 ,,	3·95	
10	Bray's 200 ,, Quadrup. Bat's-wing	Bray's Shadowless	44·4	134·40 ,,	3·02	
11	,, 60 ,, Triple Bat's-wing	,, ,,	21·6	63·00 ,,	2·92	
12	Burner and Lantern used by the Paris Gas Company, in the Rue du Quatre Septembre.		45·0	139·40 ,,	2·90	
13	Gaudet's, Paris	Gaudet's	52·8	158·10 ,,	2·99	
14	Mallet's, ,,	Mallet's	43·0	141·10 ,,	3·28	
15	Wigham's	Wigham's	60·0	150·00 ,,	2·50	
16	Sugg's 200-candle Hollow-top, Flat flame	Sugg's Octagon	66·0	201·00 ,,	3·04*	
17	Sugg's 100-candle Argand	Sugg's Octagon, new pattern	30·60	96·15 ,,	3·14	
18	Bray's Quadruple	24-inch Circular	Too recently erected	to be tested.		
19	,, 400-candle	Bray's				

* A better result—viz., 3·24—was obtained with a consumption of 45 cubic feet of gas per hour.

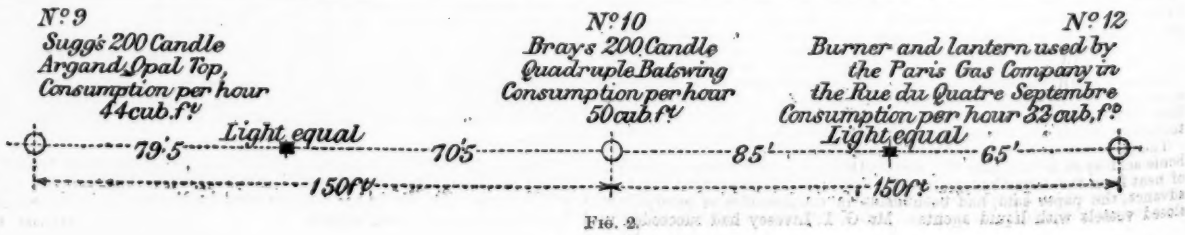


Fig. 2.

After a prolonged inspection of the various lanterns and burners, tests were made by a shadow meter [see sketch, fig. 1] between Sugg's 200-candle Argand (No. 9), Bray's 200-candle Quadruple Bat's-wing (No. 10), and the Burner and Lantern as used by the Paris Gas Company in the Rue du Quatre Septembre (No. 12), with the results shown on the diagram, fig. 2. These appear to agree pretty nearly with the photometrical results obtained from each burner, as shown in the preceding table.

On Thursday evening another trial was made between the burners Nos. 9 and 10 on the diagram. The consumption of gas in each was rated to exactly 46·75 feet per hour; and the lights were shown to be equal when the shadow meter was 73 ft. 2 in. from Bray's Quadruple Bat's-wing, and 76 ft. 10 in. from Sugg's Argand.

It should here be mentioned that the Superintendent of the works, Mr. Alfred Colson, rendered very efficient service in conducting these tests; in fact, to his able assistance Mr. Hunt is considerably indebted for the success which has attended the experiments all through.

In figs. 3 and 4 are shown the styles adopted by the Gas Committee for the new lamp-columns to be erected in various parts of the town. These pillars, which have been specially designed and made for the Corporation by Messrs. Hart, Sons, and Peard, of London and Birmingham, were much admired for their substantial, yet ornamental and effective appearance.

At the close of the inspection, refreshments were served; after which

Mr. Henry Woodall proposed a vote of thanks to Mr. Hunt for affording those present an opportunity of witnessing the interesting experiments that had been carried through so successfully, remarking on the careful and judicious arrangements that had been made for a fair and equitable comparison to be instituted between the various systems for public gas illumination now before the public.

Mr. R. O. Paterson seconded the proposal, which was carried by acclamation.

Mr. Hunt, in returning thanks, expressed the pleasure he felt at seeing so many present. It might, he said, be desirable that he should offer a word or two of explanation as to the circumstances under which the exhibition had been brought about. These experiments were initiated some fourteen months ago by the Chairman of the Gas Committee (Alderman Chamberlain, M.P.), who was desirous of showing in Birmingham what could be done with gas, in the way of street lighting, as compared with electricity. His (Mr. Hunt's) instructions were comprehensive and, he might say, liberal. He was to procure not only the most suitable burner, but also a lantern capable of diffusing the light to the greatest possible extent, and, at the same time, one that should, with the column, contribute rather to the ornamentation of the streets than otherwise. As they all knew, the question of the burner involved considerations apart from the illuminating power obtained; but his experience was that the proper form of lantern was a far more difficult matter. He might take this opportunity of acknowledging his obligation to the Gas Committee for the indulgence they had shown him with regard to the length of time that the experiments had taken. It was not contemplated by any one that they would last so long; but he felt, with the Committee, that they should, as far as possible under the circumstances, impress the character of permanence upon their work. How far they had succeeded in their aims was seen that night; but their experiments, at all events, proved one thing—that gas could hold its own for effectiveness with the electric or any other light.

THE PURIFICATION OF GAS.

By Mr. H. E. Jones, M. Inst. C.E.

At the Meeting of the Institution of Civil Engineers on Tuesday last—Mr. W. H. Barlow, F.R.S., President, in the chair—a paper was read on "The Purification of Gas," by Mr. H. E. Jones, M. Inst., C.E., one of the Engineers of the Commercial Gas Company.

In dealing with the general subject, the Author placed the purification from bisulphide of carbon in the foreground. He said that the late Dr. Letheby, in 1860, was responsible for the introduction into an Act of Parliament of a limitation of this impurity to 20 grains per 100 cubic feet of gas. Until the year 1866, no such limitation had been put upon Companies outside the Metropolis, and since then it had only been imposed in important towns. Such limitations were nowhere enforced or respected. Dr. Letheby had an opinion that it was only necessary to resort to the exclusive use of lime as a purifying material; nevertheless it was unsuccessful when adopted in the works of the late Ratcliff Gas Company, an average for two years (1875–76) giving 28 grains per 100 cubic feet. In January, 1872, the Metropolitan Gas Referees reported the impossibility of fixing a limit. In 1877 the failure of the simple lime process led to the adoption of a different plan; the carbonic acid was carefully eliminated. Success was, however, only occasionally attained, and the condition of the gas at the outlet of each purifier in the series was, in consequence, carefully tested and recorded day by day. These tests would have been a formidable business but for the introduction at that time of Mr. A. G. Vernon Harcourt's colour tests. It was found that though carbonic acid was never allowed to pass the first purifier of a set of three vessels worked consecutively, it was only possible to keep the sulphur low when the third purifier was receiving a considerable quantity of sulphuretted hydrogen. Further, that so soon as the first vessel was taken off for the necessary replenishing, the sulphur rose many grains, and did not fall until the replenished purifier had been put to work again as the third vessel, and its contents had received more sulphuretted hydrogen. [This action was illustrated by a table and diagram, as was also the action of a series of four lime purifiers.] The advantage of further carbonating the lime, on works which were closely surrounded by dwelling houses, led to the adoption of the Beckton system. As it became unmistakeable that sulphuretted hydrogen was mischievous when in excess, arrangements were made for abstracting it, as it left the carbonic acid system of purifiers, by interposing oxide of iron. This was carried out with marked improvement, and the effective life of the sulphide of lime was much prolonged. In practice, both for the relief of back pressure, and for facility in renewing a sulphide of lime purifier, the carbonic acid set of purifiers should yield the following results:—

	Crude Gas.	A.	B.	C.	D.	
Sulphur	40	52	45	30	28	Grains per 100 cubic feet.
Carbonic acid	410	300	40	—	—	
Sulphuretted hydrogen	100	900	400	—	—	

In this state of things the sulphur was generally 25 per cent. below that in the crude gas.

There was great advantage, the Author stated, in exposing the material in the sulphide of lime purifiers to a current of air. Two purifiers at the Wapping works of the Commercial Gas Company, which had become ineffective, were opened, the lime examined, stirred up, and put back, and they afterwards worked for nine and eight months respectively, and did tenfold more work than previously.

The prejudicial effect of cold in the reduction of sulphur in the carbonic acid system of purifiers, and the beneficial effect of the application of heat from the exhaust steam of an engine, were then referred to. No advance, the paper said, had been made in the direction of purifying in closed vessels with liquid agents. Mr. G. T. Livesey had succeeded in eliminating the carbonic acid to 0·5 per cent. in volume, by the use of rough caustic ammonia liquor. The tar should be separated from the gas immediately on leaving the hydraulic main. The Author, at his works, allowed the gas to leave the condensers in summer at no higher temperature than that of the atmosphere, and, in winter, than 40° Fahr. In the former case the scrubbers usually reduced the gas to the temperature of 55°, and in the latter raised it to 45°. From the Author's practice with water condensers he had found, in one type, that 1000 cubic feet of gas per day could be treated by 0·5 square oot of water.

The purification of crude gas from ammonia proper was next referred to. The process, he said, was easy. The essentials were contact with extended superficies of water, or such concentrated intimacy as involved frictional resistance to the gas, and the ultimate exposure of the gas to pure water. No sooner was lime substituted for oxide of iron in the scrubbers, than ammonia appeared in the clean gas; this had been lessened by the addition of oxide of iron catch purifiers, and removed by a small quantity of sulphuric acid and sawdust in the last catch purifier. The cost of ammonia purification was very small, the particulars of which were stated. Sulphuretted hydrogen was easily removed by lime, oxide of iron, peroxide of manganese, and sulphate of iron. Of these purifiers lime was the best, and oxide of iron the cheapest and least offensive. Oxide of iron, sulphate of iron, and manganese converted the sulphuretted hydrogen, on exposure to the air, into free sulphur, becoming oxides again, and being, as it was called, revivified.

[The discussion on the paper will take place to-night, at 8 p.m.]

THE PUBLIC LIGHTING OF PARIS.

In reference to a paragraph which recently appeared in *Galignani's Messenger*, and which has been copied into and misled some of the English and Scotch papers, to the effect that the electric light was to have been discontinued in Paris in the end of last month, we learn that such is not the case. At the meeting of the Municipal Council on the 26th ult. a report was presented by M. Cernesson, on behalf of the Third (Streets and Lighting) Committee, recommending the continuance of the light for another twelve months; and, at the same time, suggesting the curtailment of the improved system of gas lighting at present in use in the Rue du Quatre Septembre. The following is a translation of portions of the report, which was adopted:—

Taking into consideration the fact that the electric light is paid for according to the amount of light furnished, and that the value of that light is estimated by taking as a basis the actual price of gas—in other words, the price of the cheapest kind of light—the majority of the Committee are of opinion that the electric lighting might be continued in the Avenue de l'Opéra, and in each of the two Places in which it terminates, for the period of one year (that is to say, until March 1, 1881) on the existing terms—viz., at the price of 30c. per burner per hour, the Jablochkoff Electric Light Company undertaking, as previously, to bear the expense of lighting and extinguishing.

The Committee think that one-half the burners in the Rue du Quatre Septembre might be dispensed with, and probably also their consumption reduced. They, however, ask the Council to allow them to further consider this matter in conjunction with the Administration, and they will shortly make known their proposals.

MELBOURNE METROPOLITAN GAS COMPANY.

The Fourth Ordinary General Meeting of this Company—which supplies the whole of the City of Melbourne, embracing as it does the amalgamated undertakings of the late City of Melbourne Gas and Coke Company, the Collingwood, Fitzroy, and District Gas Company, and the South Melbourne Gas Company—was held on Wednesday, Jan. 28, when the Directors reported that during the half year to Dec. 31, 1879, the operations of the Company had been conducted in every department with efficiency and regularity, and had resulted satisfactorily. In compliance with the desire of the Conference of Municipal Bodies, acting under the authority of the Company's Act, the gas from the respective works had been conducted to the testing-room of the official Gas Examiner, Town Hall, Melbourne, with very satisfactory results. To provide more effectually for the requirements of the districts of Richmond, Kew, and Hawthorn, arrangements had been made for the erection of an out-station gasholder at Richmond. The purchase from the Crown of an additional area of 4 acres 3 roods 16 perches at the South Melbourne works would provide for all probable requirements of the Company at these works for many years to come. From the sum at the credit of net revenue account of £50,036 7s. 6d.,

The Directors recommended a dividend at the rate of 10 per cent. per annum, which would absorb	£27,860	10	0
To carry to a reserve-fund account	10,000	0	0
To carry forward to next account	12,175	17	6
	£50,036	7	6

The capital of the Company consists of £557,210 of shares, and £231,000 of debentures, £60,000 of which were issued last half year. The total expenditure on capital account to June last was £732,912, and during the past six months £18,895.

Dr. *Revenue Account, for the Half Year ending Dec.* 31, 1879. Cr.

Coals, including dues, &c.		£40,058	10	5	Sale of gas—	
Purifying materials & labour		2,492	0	10	Consumed by meter	£85,923 16 8
Salaries of Superintendents, Foremen, &c.		712	10	0	Public lighting and under contracts	13,638 14 0
Wages at works		7,554	6	3		£99,562 10 8
Repairs and maintenance of works and plant, less old materials sold		4,089	7	7	Residual products—	
Salaries and wages of Inspectors, &c.		1,847	1	0	Coke, less labour and cartage	£9,854 5 10
Repairs, &c., to mains and services		1,508	15	7	Tar	3,802 18 4
Repairing & refixing meters		1,602	4	0	Ammoniacal liquor	225 0 0
Lighting and repairing public lamps		2,222	7	9	Other products	60 1 10
Rents		264	18	9		13,942 6 0
Rates and taxes		562	14	0	Certificate fees	10 8 0
Directors allowances		675	0	0		
Auditors fees		42	0	0		
Salaries of Secretary, &c.		2,901	13	8		
Salaries of Collectors		1,470	0	0		
Stationery and printing		539	6	10		
General establishment charges and incidentals		282	19	8		
Gas Examiners and Assistants		154	18	10		
Law charges		190	6	3		
Bad and doubtful debts		1,347	14	8		
Subscriptions, as per vote of Shareholders		300	0	0		
Balance		42,696	11	7		
		£113,515	4	8		£113,515 4 8

THE COMPARATIVE TRIAL AT MANCHESTER OF WEST'S AND FOULIS'S SYSTEMS OF DRAWING AND CHARGING RETORTS.

Our readers may remember, at the end of last year, we announced that the Corporation of Manchester, determining to leave no stone unturned to test the relative efficiency of West's system of drawing and charging retorts, as against the Foulis hydraulic machinery for the same purpose, which has been in use at their Rochdale Road works for five years past, removed the hydraulic stokers from one of the four retort-houses in which it was employed, and replaced it by complete sets of machinery for carrying out West's system. They also made alterations to, and isolated part of the works, in order that the results obtained might be separately recorded. Among the alterations, 240 D-shaped retorts were substituted for the worn-out ones, and these, under Mr. West's directions, were fitted with Morton's mouthpieces and White's valves. In addition to this, two of Livesey's patent washers were erected to complete the arrangements on the separate system.

The following table shows the results of five days working of each system, West's being tested in one retort-house for the five days, while Foulis's was tested in three houses, the figures in the first column, "Make per House," in this case (9,105,716 cubic feet), representing the average production of the three houses for the five days:—

COMPARATIVE STATEMENT

Showing the Results of Working—under similar conditions—of Foulis's and West's Systems of Charging and Drawing Retorts.

—	Gas Made.				Cannel and Coal Carbonized.				Wages Account.	Summary of Expenditure per 1000 Feet.			
	Make per House.	Illuminating Power.	Make per Ton.	Make per Mouthpiece, 24 Hours.	Quantity.	Percentage of Cannel.	Average Cost per Ton.	Average Cost per 1000 Feet.	Cost per 1000 Cubic Feet.	Cannel and Coal.	Wages Account.	Interest, Depreciation, and Wear and Tear.	Total Expenditure per 1000 Feet.
	Cubic Feet.	Candls.	Cub. Ft.	Cubic Feet.	Tons cwt.		s. d.	s. d.	d.	s. d.	d.	d.	s. d.
FOULIS . .	9,105,716	18·05	10,266	6695·4	886 18	66·75	12 9·6	1 2·97	Wages . . 2·905 *Ponies . . 0·105 3·01	1 2·97	3·01	0·383	1 6·36
WEST . . .	10,738,200	18·19	11,709·5	8948·5	917 1	68·45	12 11·2	1 1·25	. . . . 1·68	1 1·25	1·68	0·236	1 3·16

* The ponies are used to draw the scoops to the machines in Foulis's system.

In reference to this table, it should be stated that four-hour charges were worked throughout the trials. The experiments were conducted by two specially appointed gentlemen, who had sole charge of the whole of the operations; and all necessary precautions were taken to ensure the accuracy of the figures obtained. The coal and cannel used consisted of six different kinds, an equal proportion of each being delivered to each retort-house. To make certain of this being done, special arrangements were made by the Gas Committee with the colliery proprietors and railway companies concerned.

The figures, however, do not as clearly as they might show the full advantages which have been obtained by the use of West's system—the extra make of gas, and the consequent reduction that could be effected in plant. These will be seen from the subjoined calculations based on the figures given above:—

	Cubic Feet.
West's system.—Gas made in one house in 24 hours .	2,147,640
Foulis's machinery.— Do. do. .	1,821,143
Extra quantity per day by West's system	326,497
West's system.—Gas made per week in one house . .	15,033,480
Foulis's machinery.— Do. do. . .	12,748,001
Extra quantity per week by West's system	2,285,479
West's system.—Gas made per week in four houses. .	60,133,920
Foulis's machinery.— Do. do. . .	50,992,004
Extra quantity per week by West's system . . . . or 17·92 per cent. increase.	9,141,916

From the preceding figures we learn that the

	£ s. d.
Total expenditure per million feet of gas made by Foulis's machinery is	£76 10 0
Total expenditure per million feet of gas made by West's system	63 3 4
Saving per million feet by West's system . .	£13 6 8

The saving of 3·2d. per 1000 feet actually made in the trial at Manchester amounted, on the 2,147,000 cubic feet of gas made per day, on an average, to £28 12s. 6d.

	£ s. d.
The total saving, per week, on the four houses, would be 60,133,920 × 3·2d., or	£801 10 0
To which must be added (say) 1d. per 1000 feet for the extra volume of the gas	250 10 0
	£1052 0 0

In conclusion, we may congratulate the Gas Committee and their Superintendent (Mr. G. B. Jackson) on the admirable arrangements made for this most extended trial of the new machinery, and assure them their efforts in this direction are much appreciated by the gas world at large.

DOVER GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on Tuesday, the 2nd inst.—Mr. W. R. MOWLL in the chair.

The SECRETARY (Mr. G. Fielding) having read the notice convening the meeting, the following report of the Directors was presented:—

In presenting our balance-sheet for the past half year, we again have the pleasure of congratulating you upon its satisfactory character. The consumption of gas continues to increase, and the general circumstances attending the manufacture of gas have been of a favourable character.

Owing to a very wet summer and autumn we were unable to get our new gasholder at Buckland into use as expected, which materially increased the difficulty of keeping up the heavy winter's supply; but by the exertions of those employed upon the works, this difficulty was satisfactorily surmounted.

The 230 new shares sold by auction on the 25th of September produced an average price of £14 13s. 3d. per share.

We recommend the declaration of the usual parliamentary dividend, the payment of the arrears of dividend for the year 1861, and the carrying of the balance of profit to the reserve-fund.

[The profit and loss account shows that the cost of coals during the half year was £5005 9s. 0d.; purifying, £168 7s. 7d.; repair and maintenance of works, £2117 19s. 8d.; wages, £803 6s. 7d.; the other items of expenditure making up a total of £9976 8s. 1d. Against this is credited the amount received from the sale of gas, £10,895 6s. 11d.; coke, tar, and other residuals, £2380 15s. 7d.; the remaining items making up a total of £13,677 5s. 4d., leaving available for dividend, £3700 17s. 3d. The balance-sheet shows the capital raised to be £60,500; on mortgage, £10,000; and the remaining items on the debtor side make a total of £89,417 19s. 1d. Against this there is credited for cost of works, £69,391 6s.; the book debts, amount received for coal, coke, &c., the sums invested in Consols and in bankers hands making up the total.]

The CHAIRMAN, in moving the adoption of the report, said the past half year had been the most successful the Company had passed through—a fact which should put the Shareholders on perfectly good terms with the value of their property. The balance-sheet was of the most gratifying character, there being £1022 9s. 2d. to carry to the reserve-fund, making that fund something like £3300. The consumption of gas continued to increase steadily, but relatively it had not been so large as usual in the past half year, owing to the fact that during the winter the shops had closed earlier than in former winters. Notwithstanding this, the consumption had increased, and the increase was shown in this way—that whereas in the corresponding period of the previous year 6378 tons of coal were carbonized, during last half year 6895 tons were carbonized. The whole of the work connected with the Company had gone on satisfactorily. The leakage in the mains had been rather greater than usual, not from any want of vigilance on the part of the officials, but owing to the very heavy traffic that had lately passed through the streets, and also on account of the use of the steam roller. This kind of traffic had caused some of the pipes to break, and if there were breakages there must, of course, be leakage, which amounted to about 2 per cent. more than the corresponding period of the previous year. The Board would do their best to remedy the defect, and if they could find out who were responsible for the damage, such persons could be compelled to make that damage good; but, not wishing to have litigation, the Directors had not yet taken any proceedings in the matter. The past half year had been a most profitable one, and he saw no reason why the ensuing and succeeding half years should not be equally successful. At the Directors last meeting, after reviewing the past and looking also to the future, they came to the conclusion that, with perfect regard to the interests of the Shareholders, and still securing for them their full parliamentary dividend, they were able, from the 1st of July next, to reduce the price of gas 3d. per 1000 cubic feet, thus making the net price 3s. 6d. instead of 3s. 9d. per 1000 feet He was sure this fact would be received with satisfaction by the consumers; but he would at the same time assure the Shareholders that the Directors had taken every care to secure the full parliamentary dividend. Three years ago the Company had no reserve-fund; now they had a fund amounting to £3300, and upon this they could fall back if they did not happen to make up the full dividend, though the Board would do all in their power to maintain the 7½ per cent. without having recourse to the fund. With regard to the electric light, six months ago he spoke at some length upon the probabilities of the introduction of that light, and put before the Shareholders several reasons why there was no possibility of it coming into successful competition with gas. He was happy to say that, although some of the keenest intellects were at work with a view to the further development of the light, yet there were certain difficulties which electricians were unable to master, and while these remained unmastered gas could snap its fingers at electricity. For his part he believed that until some means could be invented by which the electric light could manifest its power without continual personal attention, it could not affect gas property. Perhaps one of the best things that had happened for gas property was the electric light coming as a competitor, for it stirred the energies of the men who were interested in keeping gas to the front, and they set their wits to work for the continual improvement of the machinery and appliances by which gas was made. They, as a Board, endeavoured to keep on a level with these things, hence they had spent £2117 during the past half year in keeping the Company's property up to the mark.

Mr. BOTTLE seconded the motion, which was carried.

The CHAIRMAN then moved that a dividend of 7½ per cent. be paid for the past half year, and that the dividend due for the year 1864, at the rate of £1 10s. per cent. on the Company's stock at that period, be also paid.

Mr. MANNERING seconded the motion, and it was carried.

A vote of thanks was then unanimously accorded to the Chairman, who briefly acknowledged it, and the proceedings terminated.

BROMLEY GAS CONSUMERS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held on Thursday, the 26th ult.—Mr. ROBINSON LATTER in the chair.

The SECRETARY and MANAGER (Mr. G. H. Osborn) read the notice of meeting, and the following report of the Directors, for the six months ending Dec. 31, was presented:—

The increase of the year 1879 over 1878 in the make of gas is about 6¾ million cubic feet, equal to about 9½ per cent.; and that of the gas-rental is about £1500, or nearly 10 per cent. On the other hand, the price of coke and tar has been considerably less than in the former year, and the cost of purification has been about doubled by the increased charge now made for the use of oxide, and the more liberal use of lime to secure a good quality of gas. The item also for rates and taxes has risen from about £530 in 1878 to £680 in 1879. This is due to a heavy increase during the past year in the rateable value of the Company's property.

The result of the whole year's accounts is that the net profits fall short by the sum of £121 3s. of the amount required to pay the maximum dividends on the old capital, and so much of the new capital as has been issued; and this small sum your Directors recommend should be taken from the reserve-fund (one of the objects of which, they may remind the Shareholders, is to equalize dividends), and that the usual dividend be declared at the rate of 10 per cent per annum on the old capital, and 7 per cent. per annum on the new capital, including a proportionate dividend on such of the shares lately sold by auction as have been fully paid up, at the like rate, from Oct. 3 to the end of the year.

The Directors congratulate the Shareholders that the new works have been in the main completed during the period when iron was cheap, although it has not yet been found necessary to use the new retort-house, or the engine and boiler houses.

In pursuance of the resolution passed at the meeting of the Shareholders on August 28 last, your Directors caused 600 shares of the new capital authorized by the Company's Act of 1879 to be put up for sale by auction at the Cannon Street Hotel, which were all sold, and realized a premium of £1295. This sum, after deducting the expenses of sale—viz., £35—has been carried, in accordance with the provisions of the Act, to capital account.

During the past year a new engine and boiler house, together with boilers and exhausters, have been added to the works; also a new sulphate of ammonia apparatus, which nearly complete the proposed enlargement of the works, with the exception of the railway siding, as to which your Directors regret that they are unable to report any progress made. It is of considerable pecuniary importance to the Company that the siding should be made, and they will not cease to urge on the Railway Company and other parties interested the carrying out of this important addition to the works.

[The capital of the Company consists of £50,000 of 10 per cent., and £25,910 of 7 per cent. shares; and £17,500 of mortgage bonds. The expenditure on works, &c., to end of 1879 was £90,112.]

Revenue Account, for the Six Months ending Dec. 31, 1879.

Dr.		Cr.	
Coals, including all expenses	£4,470 13 11	Sale of gas—	
Purifying materials	74 6 2	September quarter:	
Wages and gratuities	807 16 2	Private rental, 10,092,200 feet, at 4s. 2d.	£2,102 10 10
Maintenance of works, machines, and retorts	338 5 11	Public rental	211 1 6
Repairing & renewing meters	16 7 6	December quarter:	
Lighting and repairing public lamps	142 0 7	Private rental, 25,097,100 feet, at 4s. 2d.	5,228 11 3
Rates and taxes	623 5 7	Public rental	467 14 9
Directors allowances	250 0 0	Meter-rental, the half year	158 2 0
Salaries of Secretary and Manager, Clerks, and Collector	585 0 0	Residual products—	
Stationery and printing	34 7 8	Coke, less cartage	1,894 0 11
General establishment charges	150 1 5	Breeze ,,	65 10 7
Auditors	21 0 0	Tar ,,	204 14 3
Bad debts and allowances	4 8 1	Sulphate of ammonia	467 7 4
Horses and carts	23 8 5	Rents	42 18 0
		Fitting account	150 11 8
		Rental of fittings	3 5 6
		Transfer fees	0 15 0
	£7,541 1 5		
Balance	3,456 2 2		
	£10,997 3 7		£10,997 3 7

The CHAIRMAN, in moving the adoption of the report and accounts, said he had not to congratulate the Shareholders, as heretofore, upon the continued progress of the Company to such an extent as to enable the whole of the dividends to which they were by law entitled to be paid out of the year's profits and to show a surplus, as they had in former years. It was not necessary to go far for an explanation of the causes, because they had, for the last year or two, expended a large amount—some £30,000—in works which were rendered absolutely necessary to enable them to continue their business and supply their customers, their works having become too small to enable them to keep pace with the demand for gas. This was such a healthy sign that the Shareholders need not entertain any doubt as to the desirability of laying out more capital, because there was every reasonable prospect that it would almost immediately become remunerative. The year's accounts showed that they were £120 short of the required sum to pay their full dividend, and this would, he thought, show that they had acted judiciously in increasing the price of gas 2d. per 1000 feet when they did, and the result would amply justify the Directors both in the eyes of the public and the Shareholders. It would also be apparent that no immediate prospect could be held out of a reduction to the old price of 4s. per 1000 feet, but he did not hesitate to express his belief that at no distant date they would be able to do so, and still be enabled from their earnings to pay the full dividend without recourse to the reserve-fund.

Mr. J. W. ILOTT seconded the motion.

In reply to a question as to the price charged by the Company for gas,

The CHAIRMAN said the effect of reducing the price in Bromley 2d. per 1000 feet would be to occasion a loss of £500; it would be seen, therefore, that had their price been 4s. instead of 4s. 2d., there would have been a deficit of £500 in excess of the £120 they had already to draw from the reserve-fund.

The motion was then put and adopted, and a dividend of 10 per cent. on the original shares, and 7 per cent. on the new, was declared.

The retiring Directors, Messrs. Acton and Wilde, were re-elected, as was Mr. J. Nash, the retiring Auditor, and a vote of thanks to the Chairman concluded the proceedings.

HASTINGS AND ST. LEONARDS GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on Thursday, the 4th inst.—Mr. G. SCRIVENS, J.P., in the chair.

The following report of the Directors was presented:—

There is but little on the present occasion to report, beyond the fact that the business of the Company is steadily developing itself by the opening up of new districts, and, as a consequence, an increase in the consumption of gas. To meet this increase, your Directors find it will be requisite to enlarge the carbonizing department by an additional retort-house during the present year, and they have accordingly given instructions for the carrying out of the same.

The accounts, duly audited, leave a balance of £4141 17s. 11d. for the past half year; and it is proposed to pay a dividend at the rate of 10 per cent. per annum on the £25 shares, and a dividend at the rate of 7 per cent. per annum on the £20 shares, amounting together to £3670 6s. 3d., leaving a balance of £471 11s. 8d. to be carried forward with the previous unappropriated balance.

Balance-Sheet on Dec. 31, 1879.

Dr.		Cr.	
Capital used in trade	£15,877 5 10	Balance of cash-book	£57 3 3
Directors and Auditors remuneration	165 15 0	Invested in 3 per Cent. Consols	1,000 0 0
Interest due on debentures	586 16 6	Due for arrears of private gas and meter rentals	270 3 11
Salaries and tradesmen's accounts	5,233 13 3	Quarter's private gas-rental due this day	10,525 15 0
Suspense account	1,648 9 3	Due for public gas-rentals	1,913 3 4
Insurance-fund	1,091 11 9	Due for coke, fittings, tar, &c.	1,928 16 8
Balance due to London and County Bank	2,935 16 9	Stock, as per inventory	16,946 19 4
Dividends unpaid	3 10 0		
Balance	5,079 3 2		
	£32,642 1 6		£32,642 1 6

The CHAIRMAN, in moving the adoption of the report, said it was not a long one, because there was nothing special to communicate, beyond the fact that the business of the Company was steadily increasing. He would, however, just remark that the new purifiers, ordered to be erected two years since, were completed and in full working order. The new building to contain the apparatus was not only very well adapted for the purpose, but was substantial and appropriate, and a credit to the skill of their Engineer, Mr. A. H. Wood, A.I.C.E., under whose management the works had been entirely carried out. Owing to the large increase in the consumption of gas during the extremely cold weather of the past winter, it had become absolutely necessary to increase their carbonizing power, and the Directors had commenced the foundations for a new retort-house. The various works would be entrusted to Mr. Wood, who hoped that they would be finished and ready for use in the winter of 1880-81. Those who burnt the gas quietly in their homes, with no more trouble than the turning on of a tap, knew very little of the trouble sometimes experienced, during the winter days and the longer winter nights, in keeping up a full supply. It was with very considerable difficulty, and not without much planning, that their Manager was able to give a constant supply during the past winter. But he had never failed; because, however forgiving the public might be, that would be a fault which they could not forgive. In order to have greater facilities for the supply, the Directors proposed to build a new retort-house. The accounts, duly audited, left a balance of £4141 17s. 11d., out of which it was proposed to pay the usual dividend of 10 and 7 per cent., amounting to £3670 6s. 3d., which would allow a balance of £471 11s. 8d. to be carried forward with the previous unappropriated balance.

Mr. J. TURNER seconded the motion, which was carried.

A vote of thanks was also passed to the Chairman and Directors for the efficient manner in which they had conducted the Company's business.

The CHAIRMAN said in the discharge of their duties the Directors wanted a right hand, and that right hand they had in their Engineer and General Manager, Mr. Wood, who was not only a man of theory but a man of practice. His scientific knowledge was most useful in a large undertaking of this kind, and his attention was indefatigable. He hoped they would join him in a vote of thanks to Mr. Wood for his services during the past year.

Mr. VENESS seconded the motion, and it was carried unanimously, the renewed and hearty applause giving additional proof of Mr. Wood's popularity among the Shareholders.

Mr. WOOD said he was much obliged to the Shareholders for the kind way in which they had shown their confidence in him. It was perfectly true, as the Chairman had said, that there was sometimes considerable difficulty in keeping a town of the size of Hastings well supplied with gas, because of the great variation in the requirements of the locality. Sometimes on a clear winter day there was a very small demand for gas, and sometimes on a dark or foggy day the demand was very great. They had, therefore, to have extra retorts ready to meet the fluctuating demand, and it was a great tax upon a gas manager, not only in Hastings, but in London and elsewhere. He had not known for many years—in fact, he did not know when there had been a deficiency in the quantity or quality of the gas supplied to Hastings. He could conscientiously say that it was never deficient in either respect. He was much obliged for the way in which they had received the vote proposed by the Chairman. The greatest pride of his life was to serve the Company, and receive such a mark of confidence as the Shareholders had given him that day.

The proceedings then terminated.

BATH GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Friday, Feb. 27, when the Directors, in their report, stated that the prosperous advance of the Company had been continued during the past half year. The increase in the consumption of gas from consumers by meter in the half year, as compared with the corresponding period of 1878, was 3,377,000 cubic feet, and in the year 1879 over 1878, 20,505,000 cubic feet. The result of the increase from residual products was also very satisfactory, being £919 over the corresponding half year of 1878. They pointed out that the accounts showed a profit of £6871 11s. 5d., less £375 interest on debenture stock; leaving £6496 11s. 5d., which, with the balance remaining after paying dividend to June 30 last, £435 17s. 4d., left an amount available for dividend of £6932 8s. 9d. The maximum dividends recommended on the whole of the paid-up capital of the Company amounted to £6112 10s., showing a balance of £819 18s. 9d. to carry forward.

The Company's capital consists of £40,000 of 8 per cent., and £95,000 of 7 per cent. stock; £25,000 of 7 per cent., and £12,500 of 5 per cent. shares; and £15,000 of debenture stock at 5 per cent. The outlay on capital account, including £936 last half year, is £178,012; and the Directors say that further extensions, which are urgently required, are under consideration. The Company have a reserve-fund of £22,128. During the past six months 15,882 tons of coal were carbonized. The following is the

Revenue Account, for the Half Year ended Dec. 31, 1879.

Dr.		Cr.	
Coal	£9,090 5 4	Sale of gas—	
Purifying material	604 14 11	Private consumers	£16,835 16 5
Salaries of Engineer and Assistant	260 0 0	Public lamps and on contract, including lighting, &c.	2,253 11 7
Wages at works	1,702 10 1	Rental of meters	403 6 0
Repairs and maintenance of works and plant, less old materials sold	1,292 10 10	Residual products—	
Salaries of Inspector, &c.	174 3 0	Coke, less labour & cartage	2,006 10 7
Repairs, maintenance, and renewal of mains and service-pipes	985 9 1	Breeze ,, ,,	78 5 9
Repairing, renewing, and refixing meters	443 12 4	Tar	1,225 9 10
Lighting and repairing public lamps	572 19 10	Ammoniacal liquor	1,439 0 0
Rates and taxes	829 18 9	Rents	29 11 6
Rents	59 2 9	Transfer fees	6 7 6
Directors fees, &c.	500 0 0	Services, &c.	43 7 11
Salaries of Secretary, &c.	484 3 4	Discount and casual receipts	118 1 0
Collectors commission	160 7 5	Interest allowed by bankers	108 9 3
Stationery, printing, &c.	44 11 2		
General establishment charges	329 16 10		
Auditors fees	20 0 0		
Railway siding—renewals	106 18 11		
Bad debts	35 1 4		
Total expenditure	£17,696 5 11		
Balance	6,871 11 5		
	£24,567 17 4		£24,567 17 4

TROWBRIDGE WATER COMPANY.

The Ordinary General Meeting of this Company was held at the Company's Offices in Cambridge on the 28th ult.—Mr. S. PEED in the chair.

The following reports of the Directors and of the Engineer and Manager were presented:—

The statements of account for the past year, herewith transmitted, have been duly audited, and the Directors recommend a dividend on the consolidated stock, and on the amount paid upon the allotment of the new 10 per cent. shares (issued under the Act of 1873) and upon the first call thereon, for the year; and upon the remaining calls from the dates at which they were due, at the rate of £3 15s. per cent. per annum. They also recommend a dividend on the various amounts paid at the same time on the new 7 per cent. shares (issued under the Act of 1878) at the rate of £2 12s. 6d. per cent. per annum. This will leave a balance of £40 15s. 8d. to be carried to the next account.

The Directors feel that they may fairly congratulate the Shareholders upon the progress the Company is making, although the exceptionally wet seasons and the depression in trade have continued to the past year, there being a very satisfactory increase in the revenue account.

It will be observed that the accounts show allowances amounting to £88 18s. 8d., caused chiefly by the large number of empty houses.

Both at Trowbridge and Melksham the Sanitary Authorities continue to exert themselves to secure a plentiful supply of water to the poorer classes of their districts, who so greatly need it, and the support generally afforded by the inhabitants is very encouraging.

The retiring Directors are Mr. Dennis Adams and Mr. Jacob Usher, who are eligible for re-election. Mr. John Death retires in rotation as Auditor, and is eligible for re-election.

Engineer and Manager's Report.

To the Directors of the Trowbridge Water Company.

Gentlemen,—I have to report that during the past year water from the Company's works has been laid on to 534 premises, the income from 516 of these being £339 per annum. The remaining 18 services are supplied through meters, and the amount derivable therefrom, although indefinite, will be at a minimum rate of £2 per annum each. The proportion of the above increase, due to the Melksham extension, consists of 227 services, 221 of which will produce an income of £131 per annum, the remaining 6 being supplied through meters. The total number of premises supplied in the Trowbridge and Melksham districts up to the end of the year is 2055, and of these 99 are through meters.

During the past year nearly five miles of additional mains have been laid down in Trowbridge, Melksham, and North Bradley, and in the extensions to Studley, Southwick, and Hilperton's Marsh.

The general condition of the Company's works is satisfactory.

I have the honour to be, &c.,

(Signed) HENRY TOMLISON, Engineer and Manager.

4, *Bene't Street, Cambridge, Feb.* 23, 1880.

[The capital account shows, on the debtor side, consolidated stock, £30,000; loans, £7500; received on new shares, £6723; sale of land, &c., £1269 10s. 8d.—total, £45,492 10s. 8d. Against this is credited the amount expended to Dec. 31, 1878, £41,943 1s. 8d.; ditto to Dec. 31, 1879, £1734 16s.—total, £43,677 17s. 8d.; leaving a balance of £1814 13s.]

Revenue Account, for the Year ending Dec. 31, 1879.

Dr.				Cr.			
Wages, salaries, and repairs	£220	19	2	Balance to Dec. 31, 1878	£841	15	7
Rents	120	13	9	Less dividend to Dec. 31, 1878	825	0	0
Incidental expenses	55	8	3		£16	15	7
Printing, stationery, &c.	25	17	9				
Accountant	15	15	0				
Rates, taxes, and insurance	63	4	9	Water-rental £1832 5 7			
Fittings account (gross debits)	1804	4	0	Less allowances 88 18 8	1743	6	11
Bankers commission and interest	17	9	3	Fittings account (gross credits)	2121	19	10
	£2323	11	11	Rent of mills and land	259	2	2
Interest on loans	526	10	3	Premium paid on allotment of shares	10	0	0
	£2850	2	2				
Balance	1301	2	4				
	£4151	4	6		£4151	4	6

The CHAIRMAN formally moved the adoption of the report, which, after some conversation, was agreed to. He then proposed the payment of dividend on the consolidated stock, and on the new 10 per cent. shares, at the rate of £3 15s. per cent. per annum, and on the new 7 per cent. shares at the rate of £2 12s. 6d. per cent. per annum. In doing so, he said the Directors had looked into the authorities, and found that the dividends of these two different descriptions of shares ranked *pari passu*, and they considered the Shareholders should take a due proportion of each. The amount the Directors had to divide was £1301 2s. 4d., and they gave to the 10 per cent. Shareholders 10-10ths per cent., and to the 7 per cent. Shareholders 7-10ths per cent. They were most anxious to take an honourable course in the matter, and if the Shareholders consented, they would ask counsel's opinion as to whether they were bound to pay the 7 per cent. Shareholders the same dividend as the 10 per cent. Shareholders until 7 per cent. was arrived at. If it was legal to give the 7 per cent. shares the same as the 10 per cent. until they reached their maximum, the 7 per cent. Shareholders were better off than the 10 per cent. Shareholders at the beginning. They began by paying 1 per cent., then 2 per cent., and so on. They had begun this year with an income of about £2000, which must of necessity increase, because they had been going on increasing every quarter. The first quarter of last year increased £102; the second, £93; the third, £110; and the fourth, £86. There was no question that their business was one that must go on increasing. Independently of the £2000, they had this year the profits on fittings, which were a little more than the average—namely, £320; so that they had an income of about £2300 to start with for their prospective annual income. This was a most satisfactory state of things, and there could be no question that this was one of those undertakings that must do well. There were other sources from which they might have a much larger increase than suggested. He did not think there was a single Shareholder present who would not, at their next meeting, rejoice that he had an interest in the Company. As to the equality of the positions of the two classes of shares, they were now acting on the opinion given in a case decided by Vice-Chancellor Wood, in which the Court declined to interfere, and where the circumstances were exactly the same as in their own case.

Mr. COULSON seconded the motion, remarking that he thought the question of taking counsel's opinion as to the payment of dividends might be left with the Directors.

The motion was agreed to.

Major CALDWELL proposed, and Mr. REDFARN seconded, the re-election of Mr. Dennis Adams as a Director, and it was agreed to.

Mr. ADAMS, in returning thanks, said the Company's progress was slow but sure, and the undertaking would prove hereafter a little mine of wealth to the Shareholders. They had been carrying on their business under the most unfortunate conditions, for there had been several wet seasons; and they had been working against a commercial depression such as had not been known for the last century, and which particularly depressed the cloth trade in the West of England. They had also had opposition to contend against, and this had cost them much money to overcome; but they hoped they would not encounter it again. With the revival of the general trade, which would also cause revival in the West of England trade, the Company would have a further increase of business, for he thought that the cloth manufacturers, who formerly did not want the Company to interfere with their water rights, would be glad to have a supply. If they could once persuade two or three manufacturers to take their water, the others would follow the example. If a revival in the cloth trade did not come, they would have to creep on; but he hoped to see their shares at £250 per £100 share, like those of the Cambridge Water-Works Company. As long as he was a Director he should act as warmly in the Shareholders interest as in his own.

The other retiring Director (Mr. J. Usher) was also re-elected, and Mr. J. Death was again appointed Auditor.

Votes of thanks were then passed to the Honorary Auditors (Major Caldwell and Mr. J. Death), and to the Chairman, and the proceedings closed.

INSTITUTION OF CIVIL ENGINEERS.—The Students of this Society have been recently invited to take part in a series of supplemental meetings for members of their body, to be held on the undermentioned dates, when the following papers will be read and discussed:—March 12. "Storeage Reservoirs." By Walter Cradoc Davies, Stud. Inst. C.E. March 19. "The Manufacture of Bessemer Steel Rails." By Horace Allen, Stud. Inst. C.E. April 2. "The Construction of Brick and Concrete Egg-Shaped Sewers." By Ernest van Putten, Stud. Inst. C.E. April 9. "Small Motive Power." By H. S. Hele Shaw, Stud. Inst. C.E. April 16. "Railway Tyres and Tyre Fastenings." By Robert Read, Stud. Inst. C.E. The chair will be taken at seven o'clock on each evening, and successively by Mr. Giles, M.P., Dr. C. W. Siemens, F.R.S., Mr. R. Rawlinson, C.B., Dr. Pole, and Mr. Berkley, Members of Council.

BIRMINGHAM CORPORATION WATER SUPPLY.

At the last Meeting of the Birmingham Town Council, held on Tuesday, the 2nd inst., the minutes of the Water Committee, which were presented at the previous meeting of the Council—and which were referred to in the JOURNAL of the 10th ult., p. 213—were taken into consideration.

Alderman AVERY moved that the Water Committee be authorized and empowered to proceed with the covering in of the reservoir at Monument Lane, Edgbaston, and to provide additional pumping-engines at the pumping-station at Aston, with the out-buildings and works connected therewith, and to cause the same to be completed at an estimated cost of £17,000. In the course of a long and interesting sketch of the water supply undertaking of the Corporation, he said the reason the Committee had not brought this matter before the Council earlier was, that during the four years since the transfer of the water undertaking to the Corporation they had expended the sum of £180,000 in laying 100 miles of mains in streets which before were without any water supply; in laying down a 30-inch main, without which, by this time, he could not tell what consequences might not have followed; in constructing large filter-beds; and in finishing another well at Selly Oak. Important, therefore, as the covering of the reservoir might be, the other works were much more pressing. Since the transfer of the undertaking to the Corporation took place, the total quantity of water pumped for the use of the inhabitants of the borough and the surrounding districts was as follows:—

	Total Supply.	Daily Average.
1876	3031 million gallons.	8·30 million gallons.
1877	3040 "	8·33 "
1878	3258 "	8·92 "
1879	3584 "	9·84 "

Additional pumping power was thus required for simply conveying the increased quantity of water over the area of consumption. The population in the period of four years had increased between 40,000 and 50,000 persons, and they, of course, required more water. For many years four, and at most five engines were kept continuously at work at Aston, one or two being held in reserve for repairs and contingencies; but, in consequence of the large increase in the consumption, there were times when the whole of the engines were at work 24 hours in each day, for seven days in the week, without interruption. Therefore the Council would see that the Committee were not premature in bringing their recommendation forward, but were acting prudently, and with a proper regard for present and future requirements. It was the duty of the Committee, acting on behalf of the Council, to make provision for a maximum and not an average demand; and to provide the maximum demand caused a great deal of anxiety, for it was possible, unless some measures of the kind proposed were suggested and promptly adopted, that very inconvenient consequences might follow. But, it might be asked, even if this additional water and additional works were required, were the works justified by the additional demand, and were they justified by the financial results in undertaking such a great outlay? Therefore, following the plan he adopted last year, he would state what the progress of the water department had been, with the amount of water-rental, the working charges, and the net profit. The figures were as follows:—

	Water Rental, including Charges on Fittings.	Working Charges, including Interest on Loans and Mortgages.	Net Profits after paying Annuities.
1876	£93,527	£88,727	£5,456
1877	99,816	41,264	4,649
1878	107,393	45,781	7,710
1879	114,132	49,528	10,702

The net profit for 1876 represented a year and a half. The percentage of increase from Jan. 1, 1876, to Jan. 1, 1880, in each of those branches of the department was—

Extension of works	10 per cent.
Quantity of water pumped	18 "
Water-rental	22 "
Working charges, &c.	28 "
Net profits	96 "

Therefore, if instead of the Council representing the Sanitary Authority—whose duty it was to supply the inhabitants with good, pure water, and plenty of it, and being anxious to discharge those obligations—he was addressing a commercial company, he should justify the outlay the Committee suggested upon commercial reasons, because it was the natural growth of income, and the natural growth of the demand for water more than justified the additional outlay upon the works. If it were otherwise, it would be the duty of the Water Committee to make the same representations, but it gave them additional confidence in submitting their views, when year by year they had an increased demand for water; and with respect to the value of the property, as well as with respect to sanitary reasons which it was the bounden duty of the Council to discharge, the recommendations of the Committee were fully and completely justified.

Alderman MANTON having seconded the motion, it was unanimously adopted.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

(*Continued from p.* 368.)

Mr. J. G. HAWKINS (Wigan) read the following paper on

GAS PURIFICATION.

It is unnecessary for me to point out to you the importance of the subject which I have the honour of bringing before you this afternoon, or to impress upon you the serious consideration it deserves from all those connected with gas manufacture. The subject I have chosen for my paper is that of the "Purification of Coal Gas, and the best means whereby the same may be accomplished"—a subject which has perhaps had more attention given to it than any other branch of our profession.

Even in the early days of gas-making, it was considered exceedingly desirable that the gas should be purified previous to its being sold to the consumers; but what was considered pure gas in those days would be regarded as far different to-day. Parliament has stepped in from time to time since then, and imposed certain restrictions dealing not only with the purity, but also with the illuminating power of the gas supplied by the manufacturers, and in the event of default in either of those particulars, the manufacturers lay themselves open to heavy penalties. Indeed, it is only by comparison of the present system of purification with that of the past that we can arrive at any idea of the real progress we have made in this particular branch of our business. Only a few years ago the material used for purifying gas was exclusively lime; since then this material has given place to oxide of iron, partly on account of its cheapness, and partly because it creates less nuisance to the public when taken from the purifiers. Attempts have also been made to effect purification in closed vessels, so as altogether to avoid changing the purifiers; but, as far as I am aware, they have not yet proved successful.

I have given the question of gas purification a considerable amount of attention, especially within the past few years, and the result of my experience has been such as to satisfy me that in this particular respect there is still much room for improvement, even in the best-managed gas-works. It has been said that purification does not begin in the puri-

tying-house. This is, no doubt, perfectly true, and I am convinced that with a proper-sized main from the hydraulic, together with sufficient condensing and scrubbing power, the only need we have of the oxide or lime purifiers at all is to give to the gas, if I may use the term, just a finishing touch.

Previous to the extensions that have been recently made at the Wigan Gas-Works, at a time when the annual make of gas was about 200 million feet, it was no uncommon thing for us to be compelled to change daily two and three purifiers, each 20 ft. square by 4 ft. 6 in. deep, and even then it often happened that our gas was anything but satisfactory. The fact was the purifiers were being called upon to do an immense amount of work that ought to have been done before the gas reached them at all, and in consequence of this they were rendered totally unfit to perform what I contend is their only duty—viz., to act as catch purifiers pure and simple. As soon as I had completed the extensions, a part of which consisted of larger mains from the hydraulics to the condenser, larger condensers, and two new scrubbers 60 ft. by 12 ft., it was found that instead of changing purifiers twice or three times a day, as we had been in the habit of doing, once every fortnight was quite sufficient. This caused me to proceed a little farther with my investigation. I first shut off one scrubber, and in a short time found that it gave the purifiers about 25 per cent. more work to do than before. I then shut off a portion of the condensers, which gave an additional 10 per cent., and so on; in proportion as I reduced or increased the amount of condensing and scrubbing power, so the amount of work thrown upon the purifiers varied.

Seeing, then, how very little the purifiers had to do when the scrubbers, condensers, &c., were in full work, I decided to pull a sufficient quantity of air at the inlet of the exhauster as would keep up a constant revivification of the oxide purifiers; but, owing to the deleterious effect it had on the illuminating power of the gas, it was discontinued. After a time, however, I tried the effect of pulling air at different points in the condensers, thinking perhaps it might take up and retain some of the naphtha vapours and light oils so abundant at that point. This, to my great satisfaction, proved to be the case; and it has been in this manner that the whole of the gas made at the Wigan works from the 7th of May last year to the present time has been purified. Not a single trace of SH_2 has there been in our gas during that period, except on two occasions, when we commenced to use a fresh supply of oxide of iron, and then it was only very temporary indeed; neither has the gas been below our parliamentary standard—viz., 18 candles—which I wish to state has been maintained from a mixture of ordinary Wigan Arley and four-foot gas coals exclusively.

On the 27th of October last, nearly six months from the time of its being first charged, I opened one of the purifiers to ascertain its condition, and to my astonishment I found that the oxide had become one solid mass. How the gas found its way through it I cannot imagine; suffice it to say that the aid of a pickaxe and heavy crowbars had to be brought into requisition before it could be taken out. This purifier was in due course re-charged with fresh oxide, and in turn the others were examined, cleaned out, and re-charged in a similar manner. On subjecting to analysis the material taken out of the purifiers, I found it contained no less than 72·20 per cent. by weight of sulphur, which has since been verified by another analysis made by Messrs. M'Dougall Brothers, of Manchester. I have brought a sample of the material with me, and it may be examined or tested by any person wishing to do so.

In order that I might be enabled to ascertain the exact quantity of air required to keep the oxide of iron in good working condition, I attached a small meter to the condensers, and by drawing the air through it I found that 4½ cubic feet per 1000 feet of gas, or 0·45 per cent., was sufficient.

This system of purification does not in the slightest degree affect the present method of taking out carbonic acid, bisulphide of carbon, or any of the other sulphur compounds, inasmuch as the combination of the oxygen with the oxide only takes place after the sulphuretted hydrogen has converted into sulphide of calcium the lime used for extracting these impurities.

In conclusion, I have to thank you for the kind attention you have given to my paper, and to express a hope that, if there are any points upon which you wish further information, you will kindly say what they are, and I will endeavour to explain them.

Discussion.

The Vice-President (Mr. J. Chew) said he wished to put a few questions to Mr. Hawkins. He should like to know, in the first place, whether he understood him to say that oxide of iron was exclusively used in the purifiers he had most recently constructed.

Mr. Hawkins replied that they used nothing whatever but oxide of iron.

The Vice-President said, that being so, he should like to know what became of the fumes of sulphur, if there were any, during the process of revivification. Was the gas ever tested for sulphur other than sulphuretted hydrogen, and were the Corporation bound by their Act to remove any of the other sulphur compounds not removed by the oxide of iron? At the present time one of the most important matters in connection with gas manufacture was how to avoid causing a public nuisance. The presence of carbonic acid would reduce the quality of the gas. The London Companies had been tied down very strictly, and had been obliged to resort to lime purification. He should like to know whether Mr. Hawkins had tested for carbonic acid and bisulphide of carbon, and what was the outcome.

The President said all these queries might be put in the course of the discussion, and Mr. Hawkins would, no doubt, answer them.

Mr. Paterson said the idea developed in the paper was certainly a new one, and, he thought, claimed very important consideration. If by the process adopted by Mr. Hawkins the expense attending the removal of oxide for the purpose of revivification could be avoided, and the same result be obtained by passing a current of air along with the gas, it certainly upset some of their previous notions. He did not know, however, whether it would not tend to destroy the illuminating power of the gas. They all knew very well that if they mixed air with gas they destroyed the illuminating power; but in this case the air had to pass through the oxide, and possibly the affinity they had for each other would keep up a system of oxidation. He did not see that any ill effects could be produced by liberating the sulphur. The question of carbonic acid was a different one. He believed they could not, by the ordinary process of purification by oxide, take out the carbonic acid. In order to do so they must pass it through some other purifier, because oxide had no action upon carbonic acid. If it was true that Mr. Hawkins's process produced the results claimed for t, he (Mr. Paterson) considered it a very important fact, and one that would result in a large saving of expense.

Mr. Hunter (Salford) said the idea was certainly very striking, and they accepted Mr. Hawkins's statement that such was the fact. It seemed to surpass their chemistry for the present moment, and it was for them to dwell upon it, and work it out in experience; and, if they found it the same in practice, it would be a very important discovery for them. He agreed with Mr. Hawkins with respect to making the condensers and scrubbers do the work of purification, and it quite accorded with his own experience. They had heard a great deal about carburetting gas. This seemed to be carburetting in the other extreme—introducing the air to take up naphtha and other gases. He had been to see the apparatus at Rochdale, and he thought it might be of some interest if he stated what had been his own experience. It happened that in the alteration of their Regent Road works he was able to pass the liquid products direct from the hydraulic main to the tar-well by the old pipes, while by the new pipes he allowed the products and the gas to pass together. He gained some new experience by these methods. By watching the temperature at which he kept the gas, tar, and liquor together, and taking great care that the separation took place at a given point, he found a certain increase in illuminating power. As to how Mr. R. H. Patterson arrived at the opposite result, he could not explain. He could only say what his experience was. He carefully watched the result himself, with the aid of his assistant. It was not hours, or even days of casual watching, but an elaborate test. It was a subject that would come to the front before long, and they would have to seriously consider it, and he believed they would find that the adoption of the Rochdale system or of Aitken and Young's process would be necessary. The idea in his mind was that if they could keep the gas from contact with the sooty matter in the tar, and simply carry the light oils, they would get a great increase in the illuminating power. If they only put in the naphtha and benzol, and left out the pitch or sooty matter, there was no fear of its being reduced—it became permanent gas.

Mr. Newbigging said that a few months ago he had the pleasure of travelling some miles with Mr. Hawkins, who described this process of his. He (Mr. Newbigging) was very much struck with it, and strongly urged Mr. Hawkins to write a paper on the subject, and read it at one of their meetings. He therefore took some little credit to himself for having induced the author to prepare and read his most valuable communication. The idea of revivifying oxide of iron without changing the purifiers was not, however, a new idea. Most of them would remember that Mr. Fish, formerly of Hornsey, and now of Bucharest, in Roumania, discovered that by driving a jet of steam through the purifiers—the steam, of course, drawing a certain quantity of air with it—he was able to revivify the oxide of iron in the purifiers when it became foul. The steam was also found very useful in preventing the oxide from becoming unduly heated, and liable to fire, and it produced the degree of dampness required in the purifying material. It had also been attempted in some of the gas-works in the Metropolis to draw in air through the material *in situ*, by connecting the purifiers by means of a pipe with the chimney, the draught of which was sufficient to cause the air to enter the vessels by another opening, and permeate the mass of material, thus effecting the same object. In neither of the arrangements, however, was the air allowed to mix with the gas. The failure of these plans was due principally to two circumstances—viz., the liability to firing, thus destroying the wood grids, besides being otherwise highly dangerous; and also to the consolidation of the material, causing heavy back pressure. The difficulty in both cases arose from the large amount of air introduced. Mr. Hawkins had succeeded in discovering the right quantity of air necessary, and applying it at the right place, that was at the end of the condenser, mixing it with the gas. He thus introduced one impurity for the sake of eliminating another, and this was a well-understood principle; as, for instance, in the case of sulphide of calcium arresting the bisulphide of carbon. But the curious circumstance in connection with the process was that by the means described Mr. Hawkins was able to get a much larger proportion of free sulphur in his oxide of iron than it had been possible to obtain by the ordinary means of changing the purifiers. He believed about 56 per cent. was considered the limit that could be reached; but Mr. Hawkins had been able to put in 75 per cent., and it was a question whether even then the oxide could be considered fully saturated. Another remarkable thing was the consolidation of the material. Though the stuff was almost as hard as a piece of stone, yet it seemed to be quite efficient in purifying the gas. It was now well known, since Mr. Forstall had made it plain, that when lime in the form of nodules was used as a purifier, it was much more efficient than in the form of flour. The gas seemed to penetrate right to the centre of each lump, whilst it passed through the flour without being affected. Perhaps something of the same action resulted in the case of the oxide of iron by Mr. Hawkins's process. By the adoption of this method of revivifying, it might be possible to dispense with the fourth purifier in a series; or, at least, the whole four might be employed without any of them standing off, except on rare occasions.

Mr. T. O. Paterson (Rochdale) considered this a great discovery, as it certainly was a most curious one. He had had some experience in trying to revivify the oxide at Rochdale by a steam blower; but they had the same difficulty to contend with that Mr. Newbigging spoke of—the heat. The oxide would not revivify with all their trials, and the wooden grids in one instance caught fire. He believed the blower was too small for the size of the purifiers.

Mr. Hunter (Salford) suggested that it was perhaps too large, admitting too much air.

Mr. Legge (Ossett) would like to ask Mr. Hawkins what was the amount of back pressure that he had on his purifiers. He thought it must be very great.

Mr. W. Bridge wished to know whether this was not a similar system to that which had been in operation at Longton, in Staffordshire, for ten or a dozen years.

Mr. Mitchell (President of the West of Scotland Association of Gas Managers) looked upon the subject as of very great importance to gas engineers, and he thought Mr. Hawkins had mentioned a fact which was worthy of their most serious consideration—which was, that the scrubber and condenser should be of sufficient area and capacity to treat the quantity of gas introduced. He could corroborate his statement as to the quantity of gas purified under these conditions. At the new works which he had recently erected, they had saved over 80 tons of lime in eight months, purifying about 28 million cubic feet of gas, as compared with the quantity which they used for a similar amount of gas at the old works. He did not think the pressure was increased in proportion to the depth of material employed. The lime was 32 inches deep, and he put it in one sieve, and did not find that there was above one-tenth or one-tenth and a half of extra pressure. The admission of air as a purifying agent was certainly a new feature. He had never imagined that air would have a beneficial effect upon oxide of iron in the way it was applied by Mr. Hawkins; but he thought there was something in it, because there was a possibility that in passing through the apparatus the air would become carburetted.

Mr. Eastwood (Batley) wished to ask Mr. Hawkins if he had tried the effect of drawing air in nearer the hydraulic main than the condenser. It seemed to him that if it were drawn in where the gas was hotter, it would have a better chance than at the condenser end.

Mr. Stoker (Stafford) said that some years ago they altered their method, so that it enabled them to convey the gas and tar and the liquor together from the hydraulic main a considerable distance to the entrance to the condenser. Previous to that arrangement, with the same coal and the same setting of retorts, they were troubled with naphthaline to a great extent; but since then it had never troubled them. Their condensers were horizontal, and there were also a washer and scrubber—not very large, only about 30 feet high—and, with thorough condensing and washing and scrubbing, they had a very small quantity of carbonic acid, and could purify 2½ million feet of gas with the same material that they formerly used for 1 million feet. He thought the paper a very valuable

one. If notice were taken of the different temperatures of washing and scrubbing, and if there were only sufficient power, it would be found, even though it might not be possible to revivify the oxide in the purifiers, that there would not be so much required to purify. He used Arley coal with a mixture of North Staffordshire, and the illuminating power of the gas had not been below 16 candles.

The PRESIDENT regarded the paper as exceedingly suggestive. It took one a little by surprise as to the result, though he could not agree with the statement that it was new, because it was something he had tried several times, and it was not an original idea of his. He knew perfectly well that where oxide was used for purification, it was quite safe to draw in a portion of air if the oxide was good. Air was objectionable when mixed with gas, only on account of the oxygen it contained. They might have something like 3 per cent. of carbonic acid in the gas, and yet have comparatively little difficulty in maintaining the illuminating power at 17 or 18 candles. If they had 3 per cent. of air it would destroy nearly the whole of the illuminating power. They came to the conclusion, therefore, that it was objectionable, as increasing the combustion to such a rapid extent that the carbon had no chance to remain suspended sufficiently long to become luminous. Nitrogen had not the same effect, and if they extracted the oxygen, air became simply a diluent. They, however, had no idea of carburetting the air—although it was admitted at the hydraulic main—but did it simply for the purpose of prolonging the time that the oxide should remain in the purifiers. When the gas got above a certain standard, they, in order to sail as close to the wind as possible, reduced the illuminating power in this way, and at the same time, as they thought, prolonged the duration of the oxide by driving in the air. They, however, arrived at nothing like the result mentioned by Mr. Hawkins, and it was on this account, he thought, they were indebted to him, because it opened up the prospect of a large improvement in the manufacture of gas. As to the question asked by Mr. Chew with reference to sulphur compounds apart from sulphuretted hydrogen, Mr. Hawkins would have to admit that he did not test for these. There was no doubt at all that two things were required in order to accomplish such a result. One was that the purifiers must be very large, so that not only would purification go slowly on, but that the revivification might have plenty of time. The question asked by Mr. Legge was one that suggested itself to him. He very recently tried to get the oxide as dry as possible, and it became so dry that it was difficult to pass the gas through it, the back pressure was so great; but if the oxide were put in under ordinary conditions, light and moist and open, and began to petrify, if he might so term it, in that state, all the pores would be open, and would remain so until they became filled by the precipitated sulphur, and the oxide had to be replaced by other. In large purifiers the pores would take a long time to cake up, so as to give a large amount of back pressure. He did not know whether these suggestions could always be carried out. He should fancy that Mr. Hawkins's coal did not produce very much sulphuretted hydrogen, or he could not have kept the oxide in for so long a time. Mr. Paterson said it was very free from sulphur, and he (the President) should imagine that it was. Where there was a large quantity of sulphur in the coal, such a process could not be carried on; besides, they must have an exceedingly large area in order to reduce the flow of the gas to that degree of slowness at which it was necessary the work should be done.

Mr. HAWKINS, replying to the various points raised, said he did not quite catch the meaning of Mr. Chew's question with reference to the fumes of sulphur.

Mr. CHEW said his impression was that the air was not passed in along with the gas.

Mr. HAWKINS said it was allowed to pass in along with the gas. He did not profess to take out the bisulphide of carbon, but at Wigan they did more washing with ammoniacal liquor than formerly. They washed a great deal with this material, and they had one scrubber through which clean water was passing. They found great benefit from it in reducing the sulphuretted hydrogen and other impurities. There was certainly some little back pressure, and that was the reason why he looked into the purifier, and found the oxide in the state he had described.

Mr. NEWBIGGING: How long had it been at work?

Mr. HAWKINS: From the 7th of May last year to the 27th of October. They were now working on the same process, and had had no change for a long time.

Mr. PATERSON: What was about the back pressure you had?

Mr. HAWKINS: About 16 inches.

Mr. NEWBIGGING: What is about the normal pressure?

Mr. HAWKINS: Six inches.

Mr. CLARKE: Is the 16 inches on the purifier alone?

Mr. HAWKINS: Sixteen inches from the holder to the exhauster.

Mr. W. CHEW (Blackpool) read the following paper:—

THREE MONTHS EXPERIENCE OF ELECTRIC LIGHTING AT BLACKPOOL.

Under this heading, I propose to place before you some particulars of the mode of laying down, together with the capital cost and the working expenses of the electric light plant erected last year in our town, feeling sure that it will be of interest not only to yourselves, but to the gas world generally, inasmuch as it is the only town in which electricity has been tried to the best advantage, and on a practical working scale.

In the beginning of August last year our Town Council unanimously agreed to light up the central portion of their extensive Promenade, which has a sea frontage of three miles, by means of the electric light, in a manner surpassing anything that had ever been attempted before; this system of lighting to be employed every season during the autumn months, and on days of festivity. The opening day was to be the 18th of September, and I may here say that they have accomplished their object of having created a sensational light.

The Committee appointed, together with my father, their Gas Engineer, they proceeded at once to inspect all the best-known systems, viewing, amongst others, the well-known Thames Embankment lights; but so thoroughly satisfied were they that in all these there was nothing but what some large gas-lamps would supersede, that they resolved to strike out the rather bold experiment of having large centres of lighting, and employing four naked lights of 6000-candle power on the Promenade, and one on the end of each of the two piers. The area to be illuminated was therefore a quadrangle, 1000 yards long and 400 yards wide. The four lights on the Promenade are 350 yards apart, and those on the piers about 400 yards from the shore. The whole are placed in plain glass lanterns 60 feet above the level of the roadway. This is necessary with naked lights, so as to remove the strong penetrating power from the eye when approaching the lamps, as well as to better distribute the light between them.

Having briefly described the object desired to be accomplished, I cannot do better than explain the mode of procedure adopted to produce the effect. Arrangements having been come to with Messrs. Siemens, of Charlton, near Woolwich, for the supply of the necessary electric apparatus, and with Messrs. Robey and Co., of Lincoln, for the engines, and the whole of the plant being under the control of the Gas Department, it became part of my duty to superintend its erection, and to see to its working after the contractors had completed.

The site selected as being convenient for the machinery was the Corporation Depôt, situated 400 yards from one end of the Promenade, and 250 yards inland. Here was put up a substantial timber building, 60 feet by 25 feet, and inside, on the ground, was laid a framing, which formed the foundations for the machinery, the interspaces between the timbers being filled in flush with concrete, and then boarded over to prevent dust rising. Upon this were fixed, as they arrived, two portable 16-horse power engines and boilers, and at the opposite end were the electric machines, of which there were seven, all being driven from a counter-shaft placed between them and the engines. From each of the six machines a distinct wire is led to its own lamp, and one common return wire, so to speak, answers for the whole. You will, no doubt, wonder what the odd machine was for. Well, at first, the whole of the six machines had to perform the duty of producing their own electricity, but that duty is now taken from them by specially devoting a dynamo-electric machine to that purpose solely, and this was found to be better for the lights.

The first difficulty we had to contend with was the laying of the wires inside the 2-in. and 3-in. cast-iron pipes, it having been decided to place them underground, hidden from view. This proved no easy matter, inasmuch as the wire was in 500-yard lengths, and it was desirable to have as few joints as possible. It therefore cost as much to put the wires through as it did to make the trenches, so careful had we to be in order not to damage the insulation, and to keep off the water. The weather happened unfortunately to be unfavourable for us, as, a day or two after commencing, a series of high winds set in, with their usual effect at Blackpool of forcing the water over the Promenade, to the amusement of visitors, but to the detriment of our work; for, at every tide, it filled the trenches and pipes with sea water. However, as there was no time to stop, we persevered, and completed the 1500 yards in the week allowed us, and were ready for the preliminary trial to take place on Saturday, the 13th; but, alas! all our efforts were unavailing, for the insulation of the wires had yielded to the water, and it was quite spoiled for the purpose, so there remained no alternative but to withdraw them. This we commenced on the Friday evening, and drew out the whole and laid them on the arms of the lamp-posts. By the Saturday night we had temporarily connected the wires, and had two of the most commanding lights at work with good effect. By the following Monday morning we had collected together the most suitable poles in the town, and immediately set to work and placed them up telegraph fashion, and secured the wires thereto with iron staples, there being no time to get insulators fixed. During the time the wires were being completed, experiments and trials were going on in the engine-room, and by Thursday, Sept. 18, all was finally ready, and the lights were lit at dusk with remarkable steadiness, considering the drawbacks we had to encounter for want of time.

I may tell you that it was with no small degree of pleasure I beheld, from an elevated position, the lights shedding down their bright white beams on the upturned faces of at least 70,000 persons who had come to Blackpool to witness the grand spectacle—to see the poor gas once for all annihilated. Well, I must say the gas cut a sorry figure when burning in the lamps when the electric lights were lit, of which a good many of you present were eye-witnesses; but it became very useful as the nights grew darker, and one of the new illuminants was suddenly extinguished, for it would have been unsafe to the public to have left all in darkness, which might have occurred at any moment. As we got more accustomed to its eccentricities and freaks of going out every now and then, we gained confidence, because we found out how to apply the remedy. In nine cases out of ten the cause was the rack holding the carbons getting fast, and a man was usually on the look-out to shake it with the line to the lamp. So frequently did this happen that ultimately the passing public and youths saved us the trouble by merely pulling the line as they went by. Sometimes, however, more serious mishaps would occur, owing to the exposed position of the lights, and to the strong gales of wind and rain. The delicate working parts were affected by corrosion and damp, and in such cases there was no alternative but to take the lamp in for readjustment; so it had to remain extinguished for the night, or if it was a very bad light, it was better policy to shut it off. One would naturally say, why not take out the spare lamp and substitute it for the other? This seems very simple until explained. The reason is this, that owing to all the circuits being of different lengths, and having different resistances, each lamp had to be accurately adjusted, and tried in the test-room, with the current flowing all through the wire. Thus, supposing No. 1 lamp went out, and could not be got to work again; it is 1400 yards away, and it would be necessary to send two men to lower it, couple the two wires together, bring the lamp back, and set to work adjusting the spare lamp to the circuit, which would require, say, half an hour; then to send it back and hoist it up, the whole occupying 1½ hours, during which the light would be out, and would need another attendant, who would afterwards have nothing to do, and some nights would never be wanted, although he must be always at hand.

The mode of working which we have found to be the most advantageous is the following:—One engineman and assistant look after the engines and boilers, which require very great attention in their stoking, for a variation of 5 lbs. pressure of steam will throw all the lights out of order. Another man is kept to oil the machines and keep all going right in that department, as well as to look for any light going out, which in some cases instantly shows itself at the machines, but always at a dial-board, on which all the connections are made, and on which we have suitable tell-tale appliances. The hour for starting work is one o'clock, p.m., and then the mode of procedure is as follows:—All three men start out and fix the carbons in the lamps, clean the same, and hoist them up again. To go the whole round occupies 2½ hours, if all is well. Occasionally a carbon-holder is burnt away, the lamp having burnt too hard on a windy night, and this the men generally refit with a spare holder they take with them. On these occasions three hours is about the proper time. They next return to the machine-room, clean the engines, and go carefully over the machines and belts, and then all is ready for lighting, which generally lasts five hours. We should have to go round the lamps a second time if we had to light all night; this would entail another staff, and be very expensive. I myself attend almost every evening at the Depôt during the period of lighting, to see that all is kept right, and to put in proper order all the lamps brought in, as well as to instruct the man in any repairs and alterations to be made. It is also very requisite to go round two or three times a week to see the carbons fixed in the lamps, and to adjust them a little, and to see that the current is working the right way through the lamp.

Having given you a good idea of the work to be done, I think I could not do better than proceed to give you a few particulars of the cost of all this, and I will put our system in comparison with the others, so that you may see the proportion of the costliness between large lights and the small ones, comparatively speaking—those of the divided current, or Jablochkoff system. The following figures will show the amount of the capital account. Those of Westgate-on-Sea and the Thames Embankment are from the reports of Messrs. Bennett and Valon, and of the Metro-

politan Board last May, but to the latter I have added the apparatus which I find necessary to work their plant permanently, and this enhances the capital. Each item that is added is marked with an asterisk (*). It must be noted that the apparatus at Westgate was only temporarily fixed:—

Capital Account.

Blackpool. Six Lights = 36,000 Candles available.				Westgate. Six Lights = 1182 Candles available.				Thames Embankment. Twenty Lights = 4000 Candles available.			
Two 16-horse power engines and boiler, with reserved power	£598	0	0	One 10-horse power engine and boiler	£300	0	0	One 20-horse power engine and boiler, with reserved power	£495	0	0
Counter-shaft	52	0	0					Counter-shaft	20	0	0*
Coating	13	0	0								
Seven machines (Siemens's)	800	0	0	Two Gramme machines	220	0	0	Two Gramme machines	360	0	0
Seven Siemens's lamps and six lanterns	143	0	0	Six Jablochkoff lamps, complete	60	0	0	Twenty Jablochkoff lamps, complete	200	0	0*
Terminals	12	0	0	Terminals, &c.	2	0	0	Terminals, &c.	5	0	0
Belting	60	0	0	Belting	4	0	0	Belting	35	0	0
8800 yards of cable	556	0	0	1200 yards of cable	110	0	0	3900 yards of cable	390	0	0
Posts and poles	40	0	0	Six lamp-posts	12	0	0	Twenty lamp-posts	40	0	0*
Engine-house	200	0	0	Engine-house	300	0	0	Engine-house	300	0	0*
Foundations	60	0	0	Foundations	10	0	0	Foundations	50	0	0*
Gas and water fittings	9	0	0	Gas and water fittings	9	0	0	Gas and water fittings	9	0	0*
Strophometer	10	0	0	Strophometer	10	0	0	Strophometer	10	0	0*
Velocimeter	2	0	0	Velocimeter	2	0	0	Velocimeter	2	0	0*
Tools	10	0	0	Tools	10	0	0	Tools	10	0	0*
Galvanometer battery and leclanche	5	0	0	Galvanometer battery and leclanche	5	0	0	Galvanometer battery and leclanche	5	0	0*
Ropes, tackle, stays, &c.	30	0	0								
Labour erecting, and sundry bills	200	0	0	Labour erecting, and sundry bills	46	0	0	Labour erecting, and sundry bills	69	0	0*
Total	£2800	0	0	Total	£1100	0	0	Total	£2000	0	0

Below I will compare the working expenses we are now at, and those of the others for one night of 5½ hours:—

Blackpool. 36,000 Candle Power.				Westgate. 1182 Candle Power—Four Hours Lighted.				Thames Embankment. 4000 Candle Power.			
One engineman	£0	5	0	One engineman	£0	5	0	One engineman	£0	6	8
One assistant	0	3	4					One assistant	0	6	8
Attendant and supervision	0	7	0	Attendant and supervision	0	7	0	Two assistants	0	10	0
Oil, tallow, turps., &c.	0	1	6	Oil, tallow, turps., &c.	0	0	5	Oil, tallow, turps., &c.	0	1	7
Water for boiler and general use	0	0	6	Water for boiler and general use	0	0	2	Water for boiler and general use	0	0	2*
Gas	0	0	6	Gas	0	0	6*	Gas	0	0	6*
Carbon, with waste, 10 feet at 9d.	0	7	6	24 candles at 8d., 16s. 3d.; dropped to 2d.	0	4	0	20 candles, each lasting 1¼ hours = 80 candles, at 2d. each	0	13	4*
Fuel, coke, and coal, 13 cwt. per night	0	6	6	Fuel, coke, and coal	0	6	0	Fuel, coke, and coal	0	4	9
Interest at 5 per cent.	0	11	8	Interest at 5 per cent.	0	4	7*	Interest at 5 per cent.	0	8	4*
Repairs and maintenance, 10 per cent.	1	3	4	Repairs and maintenance, 10 per cent.	0	9	2*	Repairs and maintenance, 10 per cent.	0	16	8*
Total	£3	6	10	Total	£1	16	10	Total	£3	8	8

Now, it is a very difficult matter to put the proper interest to these tables, inasmuch as the longer the lights are burned, the less is the cost per hour; but as I must compute it in some way, so as to arrive at the actual cost, I shall take our own as we intend to use it, or I will give it the benefit of being lighted every night during which our gas-lamps are alight—viz., 240 nights—and allow them to burn from 5 to 5½ hours. Any other deductions you wish can be made accordingly. In the preceding table you will note that we have two engines and boilers, and during the last week we kept the plant going with only one running; therefore, we shall compare favourably with the others in having reserve power, which is far better for working steadily and safely, and I may say it would be very necessary to have other parts of the plant in duplicate if we were working under penalties for not keeping up the illuminating power, and were fined heavily for occasionally leaving part of the town in darkness.

Before closing my paper, I will say a word or two on some of the effects which our lights have produced in different states of the atmosphere, and conclude with a few remarks on electric lighting generally as an illuminant for our cities. The four lights as now placed light up the Promenade at Blackpool very well for a length of 1500 yards, but not evenly, there being a flood of light directly under them, and not so much midway between them, though amply sufficient for any requirement. If there had been six lights on this length, the effect would have been uniform throughout. As comparing the diffusibility of the light under various conditions, the best result I have noticed particularly has been on some nights when I have been able to read the time very readily by my watch at a distance inland of about 1½ miles. This effect, I am of opinion, was caused by the reflection of some passing rain-clouds, which I noticed hanging about in large masses pretty low in the atmosphere. The same thing has been of particular benefit to some of the fishermen, who have had to go out on the sands about two miles away, at night time, to take fish, and they have many a time been able to see distinctly. The opposite effects are produced in a dense fog. I have only been able to see the lights at a distance of 100 yards, and I could see at the same distance one of the large 100-candle gas-lamps we have fixed in another part of the town, owing to the difference in the colour of the light.

The strong concentrated light of an electric lamp is very bad for the eyesight, and I would not recommend any one having a weakness in that direction to look at them. I myself, as well as the men employed, have had painful experiences of the result, although at the time we were unconscious we were being affected. While experimenting with the lamps it is not noticeable, but after leaving the room the effect is severely felt, and if badly affected there will be no sleep for you that night, but you will have to sit up and keep the eyes wide open, and shaded from light, as it is impossible to shut them, so painful are they. This result has been produced, though in a less degree, in the case of a great many who have visited the room to see the mysterious apparatus at work.

The grand idea of the divisibility and distribution of electricity in the same manner as gas or water—viz., having large leading wires or mains running through the principal streets, with small branches to each consumer—has not for a moment been entertained by any of the electricians, though this is the plan the anxious public are waiting for; the reason being that you cannot have a storeage for your supply, as with gas, where you create a large reserve, and, charging all your pipes under pressure, leave those who require it to simply turn on an outlet for the supply, and, by the grand old law of gravitation, they get all they want from the stock, while a fresh supply would be making and storing for next day in the gasholders. Not so with electricity. As it is generated, so it must be consumed; for electricity must move in a circle, otherwise it cannot be created, and as it moves it disappears. The same electricity does not move round again; it never passes the starting-point, but as it comes it dies, and makes room for more. Now, as it is impossible to store electricity in any appreciable quantities, we see that the object must be to utilize its power as it is being generated; therefore the greatest difficulty is in the distribution as produced. This will be found a great disadvantage, assuming that a town is to be supplied, for it would mean that the apparatus would have to be constantly going in order to supply light when any consumer might at his option desire to avail himself of it during the day or night. It would be like working a gas-works without holders for storeage, with the same disastrous results financially speaking—namely, increased capital, and wear and tear of retorts, plant, and now and then all darkness for a short time in the town, if a sudden draught took place on the mains, owing to a large establishment lighting up without notice. This feature in electric lighting has not as yet shown itself, it being now at the will of the manufacturer of the light when the lamps shall be lighted and put out; but let the consumer have that power left to him, which he will claim as his right if he has to pay the bill, and another difficulty is once more placed in the way of electric lighting for towns.

I am, of course, presuming that there is no difficulty in generating electricity, for it is mere mechanical power that is required. Nothing is used in its manufacture, and, consequently, there is no end to its source. This leads me to the electric lighting systems of the present day, which are nearly all alike in their working, as regards divided lights. The plan adopted is to put from half a dozen up to, say, 20 lights on one circuit—that is to say, one machine has 20 lights put on its wire from leaving the machine to coming back. The distance may be no object, so long as your wire has conducting power sufficient; but here again you are met with a difficulty, otherwise you would increase the number of lamps indefinitely; that is to say, the limits of the power of the machine is soon reached, and the more breaks or resistances you put on the circuit, so each of the lights is less in proportion, for the law of the flowof electricity is inversely as the resistance. Thus, let us suppose the current is represented by 100; now add to the outside circuit a resistance of one lamp equal to the internal resistance of the machine, which is about the best result of the Siemens machines, and you have doubled the resistance to the current; therefore, the total current is reduced to 50, of which the outside circuit has 25 available; that is to say, double the resistance, and the current is halved; treble the resistance, and the current is one-third, and so on. Therefore, you will see how quickly the lights are reduced in power, and how soon the maximum is reached, so that you could not have small lights so economical as large ones. The same is the case with lamps burning by incandescence; you all know that it is only the resistance to the current-flow that converts electricity into heat.

I really cannot see the cause for gas directors becoming alarmed lest they should be driven out of the field for lighting our houses, for I am afraid that electricity, with its delicate working parts and complicated automatic cut-off arrangements—all which are claimed to be simple in action, but which I am certain would soon get out of order if left to take care of themselves in any ordinary house—I am afraid, I say, that the cut-off arrangements now in operation would be apt occasionally, under ordinary usage, to cut off all the supply on the circuits, instead of that to a single house. For public squares, large halls, and for lighting the main thoroughfares of large towns, where more light is wanted than is now thought necessary by most local authorities, there, I say, gas and electricity will come into competition; but I am of opinion that our main thoroughfares are well illuminated during business hours by the shop lights, almost without the gas in the street-lamps; so that to employ electricity on a large scale would be a waste of money, just as much as lamps of 200-candle power being placed every 60 yards or so apart. After business hours there is, comparatively speaking, not anybody out of doors, and gas-lamps are ample for the purpose of giving light. The scope which electricity has is necessarily very limited, there not being so very many large spaces that will need to be lighted up so brightly as to justify recourse being had to it in preference to gas. There is a larger field open for it in the transmission of motive power, in which electricians may reap more remunerative employment for their labours if they will accomplish their grand idea of utilizing the tides, and the Falls of Niagara, in supplanting the present method of supplying motive power for the great industries of the world.

Discussion.

Mr. Newbigging said that his previously expressed opinion regarding electricity as a source of lighting had not undergone any change. Lighting by means of electricity was simply an expensive luxury so far. It was not a new light, as some people imagined. The electric light was about as old as gas lighting; but whereas the one had been found thoroughly practicable, and had been made subservient to our daily wants—had, in short, become an absolute necessity—the other still remained in embryo, having scarcely advanced a step towards meeting our requirements in that respect. He spoke, of course, more particularly as to the application of the light, because, without question, the means for its production had been much improved of late years. There could be no doubt that most of the

glowing reports of the past two years of its triumphant success, and its application to the general purposes of life, were concocted with an object, such object being to depreciate gas property. Unfortunately, these exaggerated reports were only too successful, and the concoctors, or many of them, had been enabled to pocket money as the result. The electric light agitation had been initiated and kept alive by dreamers and schemers. Gas engineers had no desire to minimize the singular beauty and even value, in some respects, of the electric light; they simply desired that a modicum of common sense should be brought to bear in comparing it with work-a-day gaslight. He had had the pleasure of witnessing the first electric light display that took place at Blackpool in September last. The general effect was something magnificent, but one instinctively felt that it could scarcely last. He never saw the electric light but the lines of Wordsworth occurred to his memory:—

"It was a phantom of delight
When first it beamed upon my sight;
A lovely apparition, sent
To be a moment's ornament."

He believed, however, that their Blackpool neighbours, assisted by their shrewd Gas Manager, had contrived to make the electric light not only ornamental but highly useful and remunerative. It was the only place he had heard of where it had been made to pay. These far-seeing town councillors at Blackpool kept the homely gaslight for their own use on ordinary occasions, and on *fête* days they gulled—well, he would not use exactly that word, though it was well known that gulls were plentiful enough at the sea-side, but certainly they drew no end of visitors—he could not remember how many tens of thousands—to their very delightful watering-place. It might be looked upon as a case of magnetic or electrical attraction, and from personal experience he knew they (the visitors) were galvanized in the prices they had to pay for board and lodging on the special occasion to which he referred. Referring to Mr. Chew's paper, he said that it was a valuable contribution to the subject of electric *versus* gas lighting, and would command attention throughout the country, and he congratulated Mr. Chew on the able manner in which he had arranged his information and given his practical experience.

The Vice-President said when this subject was first brought under his notice by the Mayor and one or two of the Aldermen of Blackpool, he told them that the public had a bias against gas managers having anything to do with the electric light. The number of articles which had appeared in various newspapers and magazines in all parts of the country against manufacturers of gas had led the public to the conclusion that electric lighting could not receive justice at the hands of gas managers. This was what he told the Mayor and other gentlemen, but they were determined to go on with the thing, and "gull" the public by offering them one more attraction than the place afforded. It therefore became his duty to advise the Corporation to use the light which appeared to have given the best result up to that time. It was known to scientific men that electricity used in large quantities, as in lamps of 6000-candle power, was the best way. He and some members of the Town Council visited several places, and witnessed the various lights which were in use. They examined the Jablochkoff system, and amongst other places visited Birmingham and saw the large public gardens there lighted up by 60 lamps on the divided principle. They also visited the Thames Embankment and Siemens's manufactory at Charlton. They found that these latter were the people to go to if they wanted to have the best results. The particulars as to what they had done had been laid before the meeting in the paper, and those gentlemen who had seen the electric light must know that the idea of adapting it to thoroughfares was altogether out of the question. It would not be a light that would supersede gas on the score of cost, so far as he could ascertain; but although the figures given in the paper were arrived at as carefully as possible, they could not tell the exact cost until the apparatus had been working for some years.

Mr. Hunter (Salford) remarked that for the past two years some people had been frightened by the electric light, and it had often been described to them as "the light of the future." Its advocates had had on their side nearly the whole of the newspapers, who had written up the light. No doubt it was to some extent what people said it was. It was good under certain circumstances, but these circumstances were very prescribed. It was very costly—more costly than gas. If they took 100 yards of street, he did not suppose the cost of lighting with gas would be more than ¾d. per hour, and electricity could not, he thought, be cheaper than this. He should have liked to hear from Mr. Chew what was the cost per hour of every light they had at Blackpool; but it was easy to perceive that it bore no comparison, under the most favourable circumstances, with gas, so far as the cost was concerned.

Mr. Frith (Runcorn) said a good deal of interest had been taken in the electric light in Liverpool. Living as he did a short distance from that town, he had felt interested in this matter, and had frequently seen the light in operation. The people of Liverpool were the first to obtain an Act of Parliament enabling them to spend money on the electric light. It had been introduced into a large reading-room, where it was turned on every night at half-past six. He had seen it there, but the light was flickering and pulsating all the time he remained in the room, and they could imagine how pleasant it was to sit down and read by a light like that. Another place in Liverpool where it was exhibited was in one of the large tradesmen's shops, where there was one light in the roof and another over the doorway. It was an excellent advertising medium, and from the crowds of people who went in, it would seem that the advantages to some persons were very great. It had been remarked that the electric light was not dangerous, but he knew that on one occasion a piece of the red-hot carbon which had fallen off one of the lamps set fire to some hundreds of balloons which were hung inside the building, and had well-nigh produced a catastrophe.

Mr. Mitchell (Coatbridge) observed that the electric light scare had not been confined to England. They had had a sharp attack of it in Scotland some months ago, when it was reported that Mr. Edison had discovered the method of subdividing the electric light. A practical experiment was being made with the light at St. Enoch's Railway Station, Glasgow, but it was not altogether a success, and everybody and everything about the place presented a ghastly, sickly appearance. The gas had to be kept lighted, but turned down very low, to be used when the electric light went out, as it frequently did. The use of the light had been discontinued there now, and they had fallen back upon the old system of lighting as the more preferable. One result of the experiment was that a number of improved gas-lamps were brought to Glasgow for the purpose of reasoning with the public, and convincing them that there was a future for gas lighting even yet. He did not see that the electric light offered any advantages over gas in the newest and most approved lamps, and he believed it could never be used with any advantage for street lighting.

The President wished to make some remarks before Mr. Chew replied, because he thought he could say something, which would be an addendum to the paper, with regard to another electric light which had not come in for any consideration either in the paper or in the discussion. In describing the lamp, Mr. Chew spoke of the difficulty of supplying lamps at some distance from the source of supply. This was a difficulty which had in a great measure been overcome by electricians, as had been shown in the extension of the circle on the Thames Embankment, and by other systems brought out, notably by one to which he should allude by-and-by. One remark of Mr. Chew's to which he wished to call attention had reference to the resistance which he described. He gave them the axiom that the resistance was inversely as the distance. That was a point not admitted in the evidence given before the House of Commons Committee on the question of electric lighting. The electricians stated, in fact, that they did not know what the resistance was. Further, Mr. Chew, sen., stated in his remarks that street lighting by electricity was an entire fallacy. He (the President) did not wish them to come too hastily to that conclusion because Blackpool was not successful, and the cost was enormous. He did not think the Blackpool authorities were fortunate in getting the best system of electric lighting; indeed, the best had not been brought out at that time. Since then there had come out a system of lighting by electricity, known as the "Brush" system, worked in this country by the Anglo-American Electric Light Company. This had been put in operation in a large combing-shed in Messrs. Crossley and Sons mills, at Halifax. There they turned off the gas, and had no fear that it would be required to supplement or take the place of the electric light. The light was very steady. Sometimes there was a slight flicker, owing to the point of the carbon falling off, but there was no rising, or falling, or jumping experienced in the light. He had been down on two occasions, and had spent some time looking at it. They had in this shed 16 lamps, all supplied by one machine and on one circuit. They said each lamp was capable of giving a light of 2000 candles; but, of course, this was a matter of speculation, and it was difficult for an ordinary observer to say whether it did or did not. All he could say with reference to the illumination was that it could not be obtained with gas, except, perhaps, at a very large cost indeed. One machine of 14-horse power supplied all the 16 lamps. It would work 18 lamps, and could be bought for about £400. With the exception of the machine, there was very little required in this system. There was nothing like that formidable strength of cable shown in the Siemens system, necessary; the machine was what was called a high-intensity machine, and the wires were of very moderate strength. The 16 lamps displaced about 200 gas-jets, and he assumed that the lamps and the machine, together with the cost of fixing, would be something like £750. This was the calculation which he made in his own mind. The proprietors were not willing to give very much information about it at present, but he was allowed the full privilege of making any observation he pleased, and whatever questions he put to the workmen, that they could answer, were freely answered. With regard to the lamp itself, the arrangement was most beautiful indeed. The carbons were adjusted in much the same manner as in Siemens's lamp, with the exception that the frame was double, and the rod which held the carbon was fixed to a cross-bar above, the adjusting apparatus being situated above the cross-bar. The arrangement to allow the carbons to come down gradually was very effective. There was glycerine, or some similar substance, in the top, which formed a sort of cushion, and regulated the apparatus, giving it a certain distance to travel so that the carbon came down very gradually. The lamps were also effective in another way. If one of them went out, the circuit was not broken, and there was no alteration in the light afforded by the other lamps. One might break the carbon in two and extinguish the light, but all the other lamps went on, and were not affected in the least, and one or more of them would go out in that way without disturbing the remainder. This he considered a very great step in advance. Now he would come to the cost. Taking the power at 14-horse, and the cost of the whole, as he assumed it, at about £750, interest and depreciation would amount to £75 per annum, and allowing for attendance £25, the total fixed cost per annum would amount to £100. There was in addition to this fixed cost the cost of the carbons, which they admitted to be at the rate of 1s. per hour for the 16 lamps. Then he assumed the cost of power at ¼d. per horse, or for the 14-horse power 3½d. per hour. This gave a cost of 1s. 3½d. per hour for lights to take the place of 200 gas-jets, consuming, say, 1000 feet of gas at a cost of 3s. In the case of ordinary working in winter time, the number of hours for a mill to burn artificial light was 306. This, with the electric light, cost £119, being at the rate of 1s. 3½d. per hour for ordinary expenditure, which amounted to £19, and, in addition, £100 for the fixed charges. The cost of gas, at 3s. per 1000 feet, for the same time would be £45. Now, this was really the most perfect system of electric lighting which had been introduced, and he thought it would be worth their while to consider it. There could be no doubt that in cases where particular work had to be performed, as in wool-combing, and where there were delicate colours to be manipulated, as in dyeing, this would become a most useful light; but, as would be seen, it would be more costly than gas. The advantages which it offered would, in fact, have to be purchased at a higher rate, the comparison between the electric light and gas being about 120 to 46. But as most of this was fixed cost, in cases where they could work overtime the fixed cost would be reduced, and the light might become cheaper than gas.

Mr. Chew, in reply, said that, in answer to Mr. Hunter's question, the cost of electric lighting at Blackpool was £3 6s. 10d. per night for each lamp of 6000-candle power. Referring to the "Brush" light, of which the President had spoken, he said it had been fully described in the *Electrician*. That journal some time ago contained a comparative table which showed that while the Brush light worked at an expenditure of 31 per cent. of electricity, the Wallace-Farmer machine required only 14 per cent., and the Gramme machine 38 per cent. Unfortunately the Siemens machine was not down in the table, and he could not carry the comparison so far as he should like, but he thought it was equal to the best known.

The President: No, no.

Mr. Chew said one point referred to was the extinguishing of the lights. They were not so much troubled with that as formerly, but it was due to the delicate apparatus being exposed to the weather and refusing to act. Financially, he thought gas-lamps would be more economical than the electric light. Another point mentioned was that they could not distribute the current over long distances. He did not say it could not be done. They could take the lamps ten miles from the source of supply, providing they had wires sufficient to carry the electricity.

Votes of Thanks.

Mr. Hunter then moved a vote of thanks to the ex-President (Mr. Newbigging) for the very able manner in which he had discharged the duties of the office which he held during the past year. He thought they were all indebted to Mr. Newbigging for the manner in which he had conducted the business, and for the thoughtful care he had bestowed on the arrangement of every detail connected with the work of the Institution during the past year, and also for the trouble he had taken in the preparation of papers and addresses. During the past year he had raised the Institution to a position it had never before attained. He was one of the leading gas engineers, and they were proud to number him amongst their Past-Presidents.

Mr. Clarke (Ashton-under-Lyne) had very great pleasure in seconding the resolution. When they elected Mr. Newbigging twelve months ago they expected great things from him. They had more than had their

expectations fulfilled, and the least they could do was to accord him their very warmest thanks.

The resolution was carried by acclamation.

Mr. NEWBIGGING, in reply, said that it was in no mere formal manner that he rose to acknowledge the vote of thanks that had just been passed to him, and the complimentary and kind words that the mover and seconder had used in speaking of his humble efforts to maintain the character of usefulness which the Institution had acquired. It was generally the case that one's best efforts came short of his aspirations, and he was quite aware that had it not been for the encouragement and assistance of the office-bearers and members during his term of office, he might have acquitted himself with less of credit than had fallen to his share. He could safely declare, however, that in whatever he had endeavoured to do, he had had the interest of the Institution and the advancement of the individual members of the profession strongly at heart. However much the responsible officers of an association might strive to do their duty, unless they were seconded in their efforts by the members generally, the association would be wanting in the power to confer that amount of benefit which it otherwise would. He had been fortunate in this respect during his term of office, for there had been a wealth of useful papers presented at the meetings, and every individual member present at the meetings had interested himself in the proceedings. He hoped they would each endeavour to make the term of Mr. Carr's presidency even more useful and agreeable, and they might rest assured that in so doing they would each add to their personal reputation.

Mr. FRASER moved, and Mr. BRADDOCK seconded, a vote of thanks to the gentlemen who had contributed papers to this meeting, which was carried unanimously.

On the motion of the PRESIDENT, seconded by the VICE-PRESIDENT, a vote of thanks was also accorded to the Committee, the Secretary, and the other Officers, for their services during the past year.

A vote of thanks to the President for his services in the chair, passed on the motion of Mr. PATERSON, terminated the business of the meeting.

The members subsequently spent some time in an examination of the following, viz.:—Section cut from a pipe-socket, showing Painter's hydrostatic joint, described in the JOURNAL of Feb. 17; a sample of Spence's metal—a new metallic compound for pipe-joints, &c.; a model of Holman's patent dip; and a Siemens electric lamp as used at Blackpool; all of which were placed for inspection on the table.

The members afterwards partook of tea together.

OFFICE-BEARERS FOR 1880-81.

The following are the Officers of the Institution for the current year:—

President	Mr. William Carr	Halifax.
Vice-President . . .	Mr. John Chew	Blackpool.
Treasurer	Mr. James Paterson, F.G.S. . . .	Warrington.
Honorary Secretary .	Mr. Robert Hunter	Stalybridge.

Members of Committee.

Mr. Samuel Barratt, Manchester.	Mr. G. E. Saville, Sowerby Bridge.
Mr. Henry A. Coles, Todmorden.	Mr. Harrison Veevers, Assoc. Mem. I.C.E., Dukinfield.
Mr. J. G. Hawkins, Wigan.	
Mr. Wm. Littlewood, Manchester.	

Ex-officio Members of Committee.

Mr. David Clarke, President, 1878, Ashton-under-Lyne.
Mr. Thos. Newbigging, M. Inst. C.E., President, 1879, Manchester.

Auditors.—Mr. G. Smedley, Buxton; Mr. Edmund Lord, Whitworth.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The supplies of all descriptions of round coal in this district continue much in excess of the demand, and the heavy stocks held by colliery proprietors are naturally tending to force down prices. Good round coal is now offering in the market at quite as low figures as at any time last summer, and there is every indication that, with the exception of good hard forge coal, for which a fair demand is anticipated for iron-making purposes, all classes of round coal will be very weak in price during the ensuing summer. Of the better classes, for house-fire purposes, heavy stocks are already held, and common round coals are also plentiful. So far as gas coals are concerned, there is so very little inquiry that the market has scarcely yet been tested; but it seems scarcely likely that colliery proprietors will be able to command any materially better prices than last summer, although they may not care to quote for any very long forward deliveries, as was the case last year, when many consumers were able to cover their requirements for two years ahead. In the market during the past week prices have shown a great want of firmness; sellers, in order to move away stocks, being generally willing to make concessions upon late rates. There has been no difficulty in buying best Wigan Arley coals at from 8s. to 8s. 6d. per ton at the pit, whilst inferior sorts could in some cases be bought under 6s. per ton, with prices ranging up to 7s. per ton; Pemberton four-feet averaging about 6s. 6d. per ton, and common Wigan mines about 5s. to 5s. 6d. per ton. With regard to engine classes of fuel, there is generally a firmer tone in the market, the lessened production of slack causing this description of fuel to be rather scarce. The better qualities of slack cannot now be bought under about 3s. 6d. per ton at the pit, and common sorts range from about 2s. 6d. to 3s. per ton.

The shipping trade continues dull, and it is only in exceptional cases where any improvement is reported. Steam coals delivered at the High Level, Liverpool, are being offered at from 6s. 6d. to 7s. per ton.

The heavy accumulation of stocks is compelling most of the colliery proprietors throughout Lancashire to resort to short time, and many of the pits are not now being worked more than three to four days a week.

In the iron trade there is also a dull tone, and although makers as a rule are firm, buyers have no difficulty in getting second-hand iron at under late rates. Lancashire makers of pig iron, having very little to offer, are firm at about 70s. per ton, less 2½ per cent. for delivery into the Manchester district. Finished iron makers are quoting £8 10s. to £9 per ton for bars, but merchants are offering pretty freely at about £8 5s. per ton for delivery equal to Manchester or Liverpool.

Local works in the foundry, machine-making, and engineering trades are getting rather busier, but low prices have to be quoted to secure orders.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

There has been a considerable shrinkage of business on the Tyne and Wear, and in the counties of Durham and Northumberland, within the few days of March which have elapsed. Whether it arises from over-speculation amongst our own merchants, or from political disturbances in such countries as Russia, or from a combination of causes of which these are only part, which is quite probable, business has been going back over the past fortnight. That is undoubted. The gas coal trade even has been quiet since the incoming of March. This week, however, the shipments from the Tyne are improving somewhat. The steam coal trade is in pretty much the same position as the gas coal trade. It is now admitted on all sides that what has been reported in these columns over the past two months is true. From 1s. to 1s. 6d. per ton advance over the lowest rates of last year is all that can be achieved on best gas and steam coals in the first half of 1880; 7s. per ton best gas, and from 9s. 6d. to 10s. very best steam, with 6d. per ton and less for seconds, being taken as the ruling rates. The price of coke and small coals used for manufacturing purposes in the locality is, however, very well upheld.

The coasting demand for coals is backward. There are few orders in the market, and freights remain low. There is absolutely no inquiry for sailing ships to load coals to any part of the United Kingdom. Two-thirds of the sailing ships and steamers engaged in the coasting coal carrying are regular traders which are employed by the gas companies or coal merchants in the South for a series of voyages. Merchants on the Baltic have now commenced to ship gas coals here, which were contracted for shipment from the Tyne at the first open water. Freights at the time some of these large contracts were made threatened to advance in the spring months. Instead of that, Baltic quotations which were current in January for steamers to load at the first open water are rather in excess of those current for the same trade in the middle of March. Coasting freights are very low.

The manufacturing iron trade of the Tyne is rather brisk; but the orders on hand were given out in December last. Since the middle of February there have not been many orders added to the books of the manufacturers.

The fire-brick trade is very strong. Continental manufacturers are evidently extending their works, and the shipments thence are, to a large extent, of material to be used for such purposes.

The chemical trade has been extremely dull over a fortnight. Orders have been scarce. Prices are perceptibly lower.

The price of lead has been, and is receding from the extreme quotation of a month ago. It was stated in these columns at the time that the feverish state of the market showed that, to some extent at least, it had got into the hands of operators. Subsequent events have verified this conjecture.

Since the recent advance in the value of metals, the demand for gas and water pipes has fallen off. This branch of foundry work, as reported a fortnight ago, is comparatively dull.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

In anticipation of the early opening of the railway to Oban, the Callendar and Oban Railway Company are about to erect new gas-works beside the station in that town. Pipes and other materials have already arrived, and the erection of the works will be proceeded with at once.

There has, for some time back, been an increase in the consumption of gas in Rothesay, and in consequence there have arisen a number of complaints of want of pressure. The matter was under consideration at the last meeting of the Town Council, and the result of the discussion was that the Gas Manager was instructed to prepare a report in regard to the condition of the entire works and plant.

At a meeting of the Police Commissioners of Montrose held on Monday, the 8th inst., a report was submitted by Mr. Reid, Convener of the Streets and Roads Committee, in reference to the amount of damage done to the streets by the Gas Company, and as to what ought to be charged for wayleave and damage. The practice in a number of other towns was mentioned, which was of a very varied character, and a long discussion took place on the subject, in the course of which one of the speakers urged that the question might be allowed to rest, as before the lapse of another year the gas supply undertaking would doubtless be in the hands of the municipal authorities. In the meantime, matters are to be left unchanged.

The interesting ceremony of cutting the first turf for the new gas-works at Thurso was performed on Thursday week, by Mr. Fox, Chairman of the Company, when several toasts suitable to the occasion were proposed and duly honoured and responded to. The speakers all wished a prosperous career to the undertaking. Nothing is more required in Thurso than a well-equipped gas-works, capable of supplying the town with good and cheap light, and this is now in a fair way of being provided. The Company have secured an excellent site for the works, and it is hoped that the undertaking will be pushed forward with all due speed, of which there cannot be any doubt, considering the complete preparations that have been made.

Of late there has been such an increase in the consumption of gas in Perth that the Gas Commissioners have felt it most desirable to make important extensions to their plant, one addition to which is not unlikely to be a new double exhauster of large size.

On Monday, the 8th inst., an ordinary meeting of the Broughty Ferry Police Commissioners was held, when, in reference to the proposed extension and improvement of the gas-works, the Sub-Committee reported that on the 19th ult. they had, in conjunction with Mr. James Anderson, gas engineer, Leven, examined the plans and specifications; and having heard that gentleman give full explanations in regard to the works, they agreed to instruct him to revise the same. At this meeting the Manager reported that the average illuminating power of the gas supplied during the past month was equal to 30·34 candles, which is certainly a very high standard of quality.

On Tuesday last 261 £1 shares of the Crieff Gaslight Company were offered for sale by public auction in the Drummond Arms Hotel. They were put up in 13 lots, and after some spirited bidding the whole were sold at prices ranging from 35s. to 38s. per share. The last dividend of the Company was at the rate of 10 per cent.

The Prestonpans Gaslight Company have just completed arrangements for the supply of gas from their works to the important mining village of Tranent, which lies about two or three miles inland, while Prestonpans lies upon the coast some few miles from Edinburgh.

It is satisfactory to know that the Knowes Dean reservoir, an important portion of the new water-works for the town of Galashiels, is beginning to show decided evidences of the power to retain the water that is allowed to run into it; indeed, the water is reported to be standing at a higher level now than it ever did before. Of course, this result has only been attained after the application of effort and skill extending over many months.

Mr. James M. Gale, C.E., of Glasgow, visited Dumfries on Thursday week, and, in company with some of the Water Commissioners, inspected the loch and other matters in connection with the water supply of the town, which is believed to be far from satisfactory. His report will in due course be laid before the Commission.

Last week's pig iron warrant market was very irregular, and a large amount of business was done, in which the fluctuations were rapid and violent. Down to 58s. 1½d. cash was paid on Monday, as high as 61s. 6d. on Tuesday and Wednesday, and down to 59s. on Friday. Buying for America is now reduced to a very low level.

No change of any importance can be reported in the coal market. Prices have been slightly lowered in order to induce business.

Milnrow Gas Company.—The half-yearly meeting of this Company was held on Monday, the 1st inst., when the Secretary and Manager (Mr. Benjamin Turner) read the notice convening the meeting, after which the Directors report, recommending a dividend of 8 per cent. per annum, free of income-tax, was adopted. An amount of £150 was placed to the contingencies reserve-fund.

The Extended Use of Water Gas in America.—Our readers may remember that about the middle of last year we announced that Mr. T. F. Rowland, of the Continental Iron-Works, Green Point, Long Island, N.Y., had received instructions to alter the works of the New York Gaslight Company—the oldest but one of any incorporated gas company in the United States—so as to manufacture water gas according to his patented method. We have just heard that the alterations are so nearly completed that it is fully expected the works will be in operation and supplying the new gas in the course of next month.

The Maidstone Gas Company's Bill.—Last Tuesday a meeting of owners and ratepayers of Maidstone was held to consider the propriety or otherwise of the Corporation opposing the Gas Company's Bill in Parliament. The Corporation have already petitioned in favour of a reduction of the initial price proposed by the Bill, a restriction of the amount of sulphur to 20 grains per 100 feet, and an increase of the illuminating power to 16 candles. At the meeting, the Chairman and several Directors of the Company attended, and strongly protested against the measures taken by the Corporation, and objected to the money of the town being wasted in opposing the Bill. A resolution, however, proposed by Alderman Ellis, and seconded by Mr. Page, authorizing the Corporation to oppose the Bill in its present form, was passed with two dissentients.

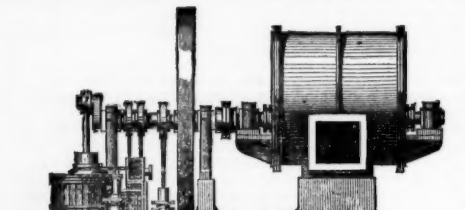
Stourport Water Supply.—This town has just provided itself with a public water supply, and the ceremony of turning on the water took place on Saturday, the 6th inst. Mr. E. Baldwin, the Chairman of the Local Board, who turned on the water, mentioned that his father 60 years ago first turned gas into the town, at a time when London Bridge was still hung with oil-lamps. Hitherto the supply of water for domestic purposes has been obtained from shallow wells; but it is now furnished by the Kidderminster Corporation, at a rate of 6d. per 1000 gallons, the contract being for 33 years, with the option of a renewal at the end of that period. This price to be paid until the population require over 20 million gallons per year, and then the Kidderminster Corporation undertake to revise the charge, with a view to some reduction.

Chesterfield Water-Works and Gaslight Company.—The half-yearly meeting of this Company was held on Wednesday, Feb. 25, when the report presented by the Directors stated: "The revival in trade generally has not at present affected materially the revenue of the Company, and the sales of gas and water have been retarded by the large number of vacant houses and shops." The balance of revenue account was £364 15s. 11d. less than for the corresponding period of the previous year, though the profit for the whole year was £11,701 6s. 8d., or £559 17s. 2d. more than was necessary to pay interest and maximum dividends. The total paid-up capital of the Company is £178,108, and miscellaneous receipts on capital account bring the total up to £180,210, of which amount £86,214 has been expended on the water-works, and £89,670 on the gas-works. The net income from the sale of water last half year was £3248 14s. 10d.; from gas, £5790 19s. 10d.; from residuals, £827 19s. 11d.; and from rents and sundries, £16 3s. 6d. The expenditure was £3585 3s., which left £6298 15s. 1d. to be carried to net revenue account.

Woolwich, Plumstead, and Charlton Consumers Gas Company.—The half-yearly meeting of this Company was held on Wednesday, Feb. 25—Mr. J. Henderson presiding. A very favourable balance-sheet was presented, and the reduction made last year in the price of gas enabled the Directors, under the sliding scale, to distribute an increased percentage of profits. The highest possible dividends on the several kinds of stock were declared, and general satisfaction was expressed at the progress and position of the Company. The choice of Mr. J. R. Jolly to fill the vacancy on the Board caused by the death of Mr. John Hammond, the late Chairman, was confirmed; and he was re-elected for three years, together with Mr. Tongue, Mr. Blanchett, and Mr. James Blest. It was also resolved, as a recognition of the valuable services so long rendered to the Company by the late Mr. John Hammond, to vote the sum of £100 to his family. In connection with the meeting, we may mention that both this Company and their neighbours, the Woolwich Equitable Gas Company, have given notice of another reduction in price, from Jan. 1 last, of 3d. per 1000 feet. The present price in the two Companies districts is now 3s. 3d. per 1000 feet.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

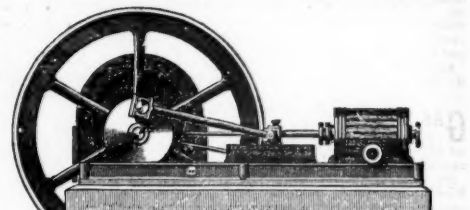
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

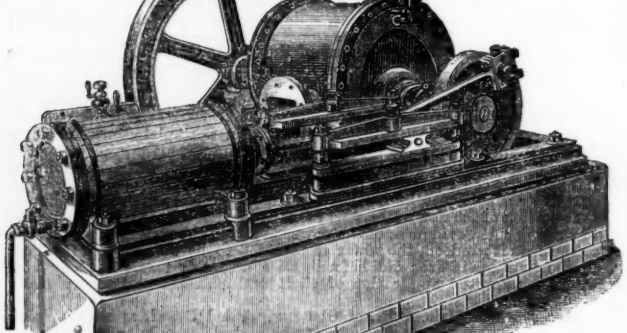
GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS,



WITH

Wrought-Iron Spindles and

ENGINES COMBINED.

SOLE MAKERS,

GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

[*SEE ALSO ADVERTISEMENT, PAGE* 422.]

Phœnix Engineering Works:

HOLLAND STREET, SOUTHWARK, S.E.

WANTED, Readers of the NEW Edition, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, by the Advertiser, a Situation as GAS MANAGER in a Works making from 15 to 30 millions. Good testimonials and references. Six years in present situation.
Address No. 635, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Advertiser, aged 20, a Situation in a Gas Company's Office (in Manager's Office of a moderate size town preferred). Has been 3½ years in a Gas Company's Office.
Address No. 637, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Advertiser, who is between 30 and 40 years of age, a Situation as GAS MANAGER in a Works making from 20 to 40 millions. Five years Manager in present situation.
Four recent testimonials and statistics of the present working will be sent upon application to No. 636, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO CORPORATIONS, COMPANIES, AND OTHERS.

PLANT Erected for Working Nitrogenous Matters, such as Night Soil, Sewerage, Hair Waste, &c., into Ammoniacal Liquor, Liquor Ammonia, Sulphate of Ammonia, and Residuals; or plans and specifications supplied. Price on application. Also Working Models of above apparatus sent c.o.d., carriage paid, price £3 8s.
Address JOHN G. HARVEY, Milnsbridge, HUDDERSFIELD.

TO BE SOLD.—The Stanstead Gas-Works, near St. Margaret's Station, Great Eastern Railway, Hertfordshire.
Apply to GEORGE DAVIS, SUTTON-ON-HULL.

WATER-WORKS DEBENTURES TO PAY SEVEN PER CENT.

TO BE SOLD—Debentures in the Truro Water-Works Company, having about 3½ years further to run, at a price that will pay the buyer 7 per cent. The debentures constitute a first mortgage on the whole of the property of the Company and form part of a series of £4000, the only amount the Company is authorized to raise by their Act of Parliament.
Applications, by letter, to be made to No. 632, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS SHARES to be Sold in the Uxbridge and Hillingdon Gas Company. Between 40 and 50 fully paid-up shares, for some years paying maximum dividends.
For particulars apply by letter to Mr. C. HORSLEY, 22, Wharf Road, CITY ROAD, N.

FOR SALE—A Set of Four Purifiers, each 18 ft. long by 8½ ft. wide, and 6 ft. deep, with Centre-Valve and 12-in. Connections complete.
Parted with as being too small.
Offers to be addressed to the MANAGER, Edinburgh and Leith Gas Company, Baltic Street, LEITH.

GAS PLANT FOR SALE.

THE Coventry Gas Company have for SALE—
SCRUBBERS.—One 5 ft. 6 in. diameter, 20 ft. high. One 5 ft. 6 in. diameter, 15 ft. high. One 5 ft. diameter, 20 ft. high; with or without 8-in. Connections and Valves.
GASHOLDER.—One Telescopic, 40 ft. diameter and 34 ft. high, in two lifts; Cast-iron Tank for same, 41 ft. 6 in. diameter, 18 ft. high.
STEAM-JET VENTILATOR.—One No. 2 Körting's Patent Jet Ventilator, with Chest. One No. 3½ Körting's Patent Jet Blower.
VALVE.—One 12-in. Cathels's Four-way Valve.
The above are being replaced by large apparatus, and can be removed at once. Also a 100-light Gas Apparatus (Porter's make).
For particulars and prices apply to
W. L. ROBINSON, Manager.
Gas-Works, Coventry, Feb. 21, 1880.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—
About 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. 28 Mouthpieces, D-shape, 16 in. by 20 in., with Wrought-Iron Lids, Cross-Bars, Stand, Bridge, and Dip Pipes. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12 in. Slide-Valves and 12 in. Connections.
Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12 in. Connections.
Exhauster (Jones) to pass about 15,000 feet per hour.
Exhauster (Beales) to pass about 25,000 feet per hour.
Two Vertical Steam-Engines, each about 6-horse power, with Pulleys, and Shafting used for driving the above.
Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.
4-horse power Horizontal Steam-Engine.
Three 4-in. Pumps, with cranked Shafting and a pair Mitre Wheels.
Two Purifiers, 16 ft. by 8 ft., with six 12-in. Slide-Valves and 12-in. Connections.
Station-Meter by A. Wright and Co., London, with three 12-in. Slide-Valves, and 12-in. Bye-Pass and Connections, to pass about 25,000 feet per hour.
Gasholder, Double Lift, with Cast-Iron Tank, capacity 87,000 feet.
Gasholder, Double Lift, capacity 100,000 feet.
Gasholder, Double Lift, capacity 240,000 feet.
One 12-in. Governor, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.
Two 12-in. four-way faced Valves, by Cockey.
For further information, &c., apply to the undersigned.
R. MORLAND, Engineer.

THE Sunbury-on-Thames Gas Company have FOR SALE the following PLANT, in good condition, thrown out to give place to larger:—
Two Purifiers, 5 ft. by 3 ft. by 3 ft. deep.
Six-inch Connections with Lifting Screw and Traveller complete.
Three 6-in. Cathels's patent Four-way Valves.
Station-Meter to pass 1500 feet per hour, 4-in. Connections.
Five-inch Condenser, nine Pipes, and Tar Box with Overflow Pipe.
Six 6-in. Donkin's Valves.
For particulars and price apply to Mr. JOHN SMITH, Manager, Gas-Works, Sunbury-on-Thames. MIDDLESEX.

CORPORATION OF LEICESTER—GAS DEPARTMENT.

EXHIBITION OF GAS-ENGINES, COOKING-STOVES, BURNERS, AND OTHER APPARATUS.

THE Gas Committee of the Corporation of Leicester intend holding, from the 12th to the 17th of April next, an EXHIBITION of all kinds of Apparatus or Appliances showing the Advantages and Economical Uses of Gas for Engine, Cooking, Domestic, and other purposes. They will provide space, gas, and connections free, and give Certificates of Merit.
Intending Exhibitors will be furnished with printed conditions, forms for allotment of space, and any further information, on application to
G. A. AND C. S. ROBINSON, Managers.
Gas Offices, Millstone Lane, Jan. 23, 1880.

AMMONIACAL LIQUOR.

THE Best Continuous Method for Working Large or Small Quantities of Liquor. This is an improvement on what is known as the "Coffey Still Process." The result in sulphate of ammonia is very large, nearly every atom of ammonia gas being driven out of the liquor before it is liberated, also a saving in acid. Small Working Models to work about 5 gallons per day, with steam boiler and every requisite, sent c.o.d., carriage paid, price £4 4s.
Address JOHN G. HARVEY, Milnsbridge, HUDDERSFIELD.

THE Castletown Gaslight Company (Isle of Man) invite TENDERS for the Supply of 400 Tons of Best Screened GAS COAL.
Tenders to be accompanied with analysis, and to be sent in by the 20th of March.
Price to include delivery at Castletown.
Further particulars may be had on application to
J. STOWELL, Secretary.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Directors of the Glossop Gas Company are prepared to receive TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR produced at their Works for One, Three, or Five years. A separate quotation to be named for each of the aforesaid periods.
Payments to be made in cash monthly.
Tenders to be sent in on or before April 10, 1880, addressed to the Chairman, endorsed "Tender for Tar and Ammoniacal Liquor."
Further particulars can be obtained on application to the undersigned.
JAS. DALGLIESH, Manager.
Gas-Works, Glossop, March 13, 1880.

BOROUGH OF HALIFAX

TO BRASS AND IRON FOUNDERS.

THE Gas-Works Committee of the Halifax Corporation invite tenders for the Supply of Brass GAS-COCKS and Wrought-Iron TUBING for a period of Twelve months.
Forms of tender and further information may be obtained on application to Mr. Wm. Carr, Engineer, Gas-Works, Halifax.
Tenders, properly endorsed, must be sent to me on or before Thursday, the 18th of March inst.
By order,
J. ALLEN, Town Clerk.
Town Hall, Halifax, March 5, 1880.

CHESTER GAS-WORKS.

CONTRACT No. 1.

THE Directors of the Chester United Gas Company are prepared to receive TENDERS for the Excavation for a Cast-Iron Annular Tank, Formation of Concrete Foundation, Building of Brick Piers, &c.
Plans and specification may be seen, and forms of tender with bill of quantities may be obtained, on application to the Engineer, at the Company's Offices, Chester, and sealed tenders must be sent in on or before Tuesday, the 23rd of March inst., addressed to me, and endorsed "Tender for excavation for Cast-Iron Tank, &c."
The Directors do not bind themselves to accept the lowest or any tender.
JAMES PYE, Secretary.
The Gas-Works, Roodee Station, Chester.

CHESTER GAS-WORKS.

CONTRACT No. 2.

THE Directors of the Chester United Gas Company are prepared to receive TENDERS for the Construction and Erection of a TELESCOPIC GASHOLDER in Two Lifts, each 24 ft. deep—Outer lift 90 ft. 6 in., and Inner lift 89 ft. in diameter.
Plans and specification may be seen, and forms of tender with bill of quantities may be obtained, on application to the Engineer, at the Company's Offices, Chester, and sealed tenders must be sent in on or before Wednesday, the 24th of March inst., addressed to me, and endorsed "Tender for Construction and Erection of a Telescopic Gasholder."
The Directors do not bind themselves to accept the lowest or any tender.
JAMES PYE, Secretary.
The Gas-Works, Roodee Station, Chester.

COMMERCIAL GAS COMPANY.
NOTICE is hereby given that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on FRIDAY, the 2rd of April, 1880, at Twelve o'clock at noon, to receive the Report of the Directors, to declare a Dividend, to authorize the raising of additional Capital, to determine the remuneration of the Secretary, to elect Directors and an Auditor in the place of those retiring, and for other business.
The Books will be closed for the transfer of Stock from the 20th day of March inst. to the 2nd of April next, both days inclusive.
By order of the Board,
H. D. ELLIS, Secretary.
Offices, Stepney, March 12, 1880.

THE BRITISH GASLIGHT COMPANY, LIMITED.
NOTICE is hereby given that the HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at this Office, on WEDNESDAY, the 31st inst., at One o'clock precisely, to transact the usual business, and to declare the Dividend for the Half Year ending the 31st of December last.
Notice is hereby also given that the Transfer Books of the Company will be closed on the 19th, and re-opened on the 1st of April.
By order of the Court of Directors,
FREDERIC LANE LINGING, Secretary.
Chief Office, No. 11, George Yard, Lombard Street,
London, E.C., March 12, 1880.

THE Pembroke Dock and Town Gas Company, Limited, invite OFFERS for the AMMONIACAL LIQUOR produced at their Works.
Particulars may be had of the undersigned.
J. H. SILCOX, Manager.
March 11, 1880.

BOROUGH OF SALFORD.

TENDERS are required for the Supply and Delivery of Cast-Iron GAS-MAINS of different sizes.
Specification and full particulars as to weights, strengths, and lengths, and all other information, may be obtained from the Engineer, Mr. Samuel Hunter, Lamb Lane Gas-Works, Salford.
Sealed tenders, endorsed "Cast-Iron Gas-Mains," must be delivered to me not later than Twelve o'clock at noon on the 29th inst.
The lowest or any tender will not necessarily be accepted.
By order,
CHRIS. MOORHOUSE, Town Clerk.
Town Hall, Salford, March 11, 1880.

BOROUGH OF SOUTHPORT.

THE Gas Committee of this Corporation invite TENDERS for the Supply and Erection complete, at their Crowlands Gas-Works, of Two PURIFIERS, each 20 ft. square by 5 ft. deep. Also Centre-Valve and Lifting Apparatus.
Plans and specification may be seen at my Office, Eastbank Street, Southport.
Tenders, endorsed "Purifiers," addressed to Keighley Walton, Esq., Town Clerk, Southport, must be sent in not later than Wednesday, the 31st of March inst.
By order,
JNO. BOOTH, Manager.
Southport, March 12, 1880.

THE Directors of the Rochester, Chatham, and Strood Gaslight Company are prepared to receive TENDERS for the Supply of 24,000 Tons of GAS COALS, to be delivered during the Twelve months commencing the 1st of June next, and ending May 31, 1881, or for a similar quantity yearly for Two or Three years, according to specification, conditions, and forms of tender, which may be had on application at their Office, 56, High Street, Rochester, where tenders, marked "Tender for Coals," must be delivered before noon of Thursday, the 1st of April.
The Directors do not bind themselves to accept the lowest or any tender.
By order,
W. SYMS, Secretary.

CITY OF HEREFORD.

CONTRACT FOR GAS COAL.

THE Gas Management Committee of the Hereford Corporation hereby invite TENDERS for the Supply of Best GAS COALS for One or Two years (stating the rate for each term separately) from the 1st of May next. The quantity required will be from 3000 to 5500 Tons per year.
The whole of the Coal to be well screened, free from bats, dirt, or pyrites, and fit for gas-making purposes, to the satisfaction of the Manager of the Gas-Works.
Parties tendering to quote price put into the Corporation's waggons at the pit.
Tenders, endorsed on the outside and addressed to the Chairman, Gas Management Committee, are to be delivered by 11 a.m., on Tuesday, the 6th of April next.
The said Committee do not bind themselves to accept the lowest or any tender.
By order,
WILLIAM DAVIS, Engineer.
Gas Office, Commercial Road, Hereford,
March 9, 1880.

SECOND-HAND ENGINES, EXHAUSTERS, BOILERS, &c.

THE Scarborough Gas Company invite OFFERS for the Purchase of their present Duplicate Exhausting Machinery, comprising Two 7-in. Cylinder by 14-in. Stroke Horizontal Steam-Engines; Two 20,000 cubic feet per hour Gwynne and Beale's Patent Exhausters; Two Hydraulic Governors in Connection with Throttle Valves of Engines; and Two Cornish Boilers, 11 ft. by 3 ft. 9 in.
The whole are of superior make and have been carefully used, and are well worth attention, being about to be removed for replacement by larger and more powerful apparatus.
The machinery may be seen in operation until the 30th of April, and further particulars may be obtained on application to the undersigned.
By order,
WILLIAM J. MOON, Manager.
Scarborough, March 5, 1880.

PARTICK STATION, GLASGOW CORPORATION GAS-WORKS.

EXTENSIVE PUBLIC SALE OF THE WHOLE MATERIAL OF THE PARTICK GAS-WORKS.

(Belonging to the Glasgow Corporation Gas Commissioners, who have now transferred the manufacture of gas for that district to their extensive new works at Dawsholm.)

MORRISON, DICK, and M'CULLOCH are instructed to Sell by Auction, at the Partick Station of the Glasgow Corporation Gas-Works, on Friday, the 2nd of April, at Twelve o'clock exact, the whole extensive PLANT and MATERIAL, including Telescope Gasholder, 100 ft. diameter, rises 40 ft., and capable of holding 350,000 feet, made by Hanna, Donald, and Wilson, in good condition, and almost equal to new; Single-lift Gasholder, 80 ft. diameter, rises 19 ft., by Hanna, Donald, and Wilson, and capable of holding 90,000 feet; Small Single-lift Gasholder, by Hanna, Donald, and Wilson, 40 ft. diameter, rises 20 ft., and capable of holding 26,000 feet; Beam High-Pressure Steam-Engine, by M' nie and Mirrlees, 14-in. Cylinder, 3-ft. Stroke; Jones's Exhauster, with 18-inch Connections; Large Station-Meter, 9 ft. by 9 ft., by S. Crossley, London, registers 10,000,000, in good order; 18-in. Governor, with Beam, by R. Laidlaw and Sons, nearly new, with Connections; another 18-in. Governor, with Float, by Parkinson; Scrubber, 7 ft. 6 in. by 7 ft. by 16 ft. high; 2 Box Condensers, each 61 ft. long by 13 ft. high; another Box Condenser, 74 ft. long by 13 ft. high; 4 Purifiers, each 18 ft. 6 in. by 11 ft., with Valves and Connections; 4 Purifiers, each 8 ft. 6 in. by 8 ft., with Valves and Connections; 8 Purifiers, each 8 ft. 6 in. by 5 ft. 6 in. and Centre Valve; about 200 ft. Hydraulic Mains, 18 by 18, supported on 22 Cast-iron Pillars; about 200 ft. Hydraulic Mains, 14 by 14, supported on Wall Brackets; Malleable and Cast-Iron Metal Work of 120 Retorts; extensive ranges of 18 and 15 in. Cast-Iron Pipes, outside and underground, through whole Works, Building Materials, &c.

The whole will be on view on Thursday, the 1st of April, from 9 a.m. to 6 p.m.; or Mr. GRANGER, Manager, will allow inspection any time prior on an admission order, to be had from the Auctioneers.

Details in Catalogue, to be had at our Office, 98, Sauchiehall Street, Glasgow; or forwarded, post free, on request.

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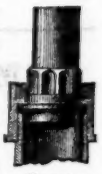

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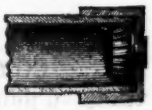

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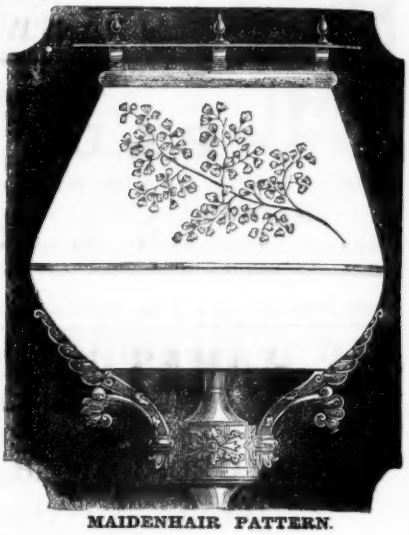

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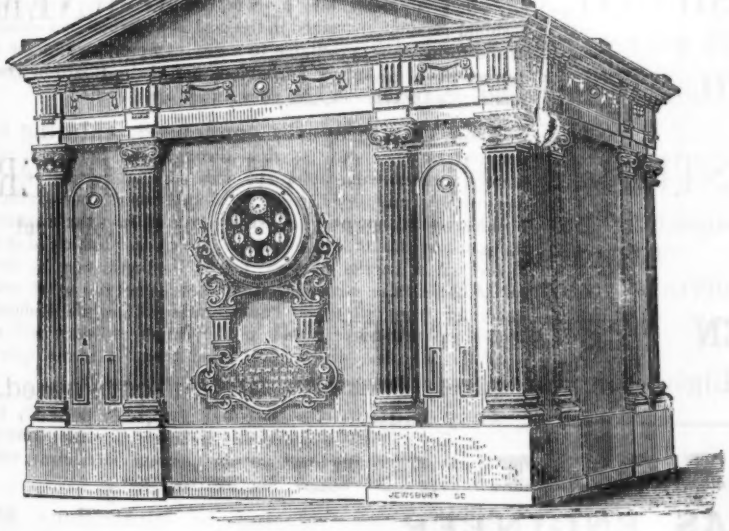

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Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

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Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

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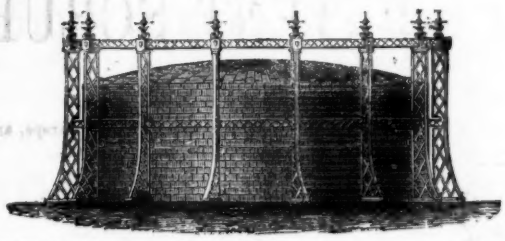

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TIPTON, STAFFORDSHIRE.

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AND ALL REQUISITES FOR EITHER

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ALSO

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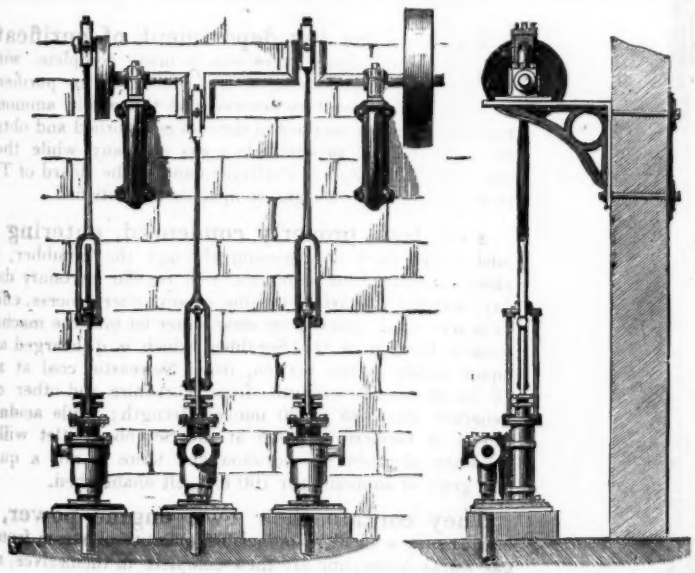
BLAKE'S PATENT DIRECT-ACTING STEAM-PUMPS.



IMPROVED DOUBLE-ACTION PUMPS.

For Water. For Tar. For Ammoniacal Liquor.

This illustration shows an arrangement of three (No. 179) Improved Double-Action Pumps driven from the same crank-shaft, as frequently supplied for use in Gas and Chemical Works. The suction and discharge pipes can be arranged for drawing from and delivering in any required direction

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John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

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effecting a great saving of time, labour, and expense.

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Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1¼ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

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Yields 14,920 cubic feet of 40·92-candle gas per ton.

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12,530 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

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Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

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This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

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POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal *yields in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

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THE Tawd Vale Colliery Company, Limited, are prepared to Contract for the Supply of their superior Arley and other GAS COALS, and to send samples to the order of Gas Engineers and others, or complete Analysis, on application. Shipped at Liverpool, Preston, Fleetwood, Garston, or Birkenhead.

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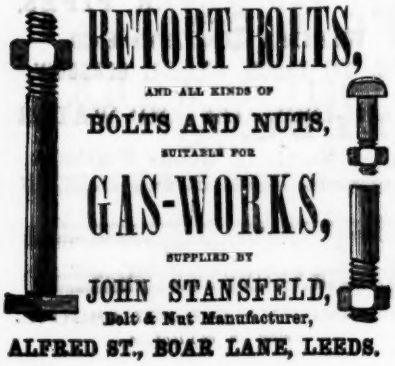

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SUITABLE FOR

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STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

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PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

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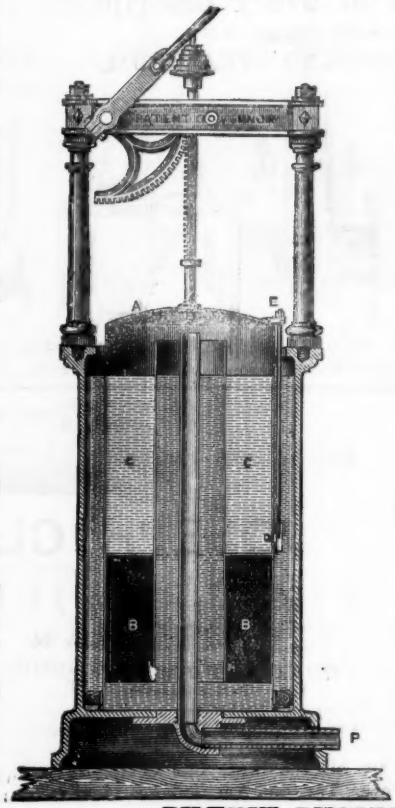
GEORGE WALLER & CO.,

GAS AND HYDRAULIC ENGINEERS,

Patent Compensating Steam Governor,

WITH SELF-CONTAINED WATER-BALANCE.



This is the most efficient and perfect Governor yet made to control and regulate the speed of Engines and Exhausters according to the varying make of gas, and maintain a steady gauge, whether working level or with six inches of seal.

It is the only Governor that will effectually control Condensing and Compound Engines, especially when the Exhauster is on light work, and the Engine is large.

During the drawing and charging of Retorts, the Engine requires no attention—a matter of great importance in small works.

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and about 30 other works.

G. W. and Co. make **special Steam Throttle Valves,** suitable for working with this Governor, and alter existing Throttle Valves to same plan.

See also advertisement, page 414.

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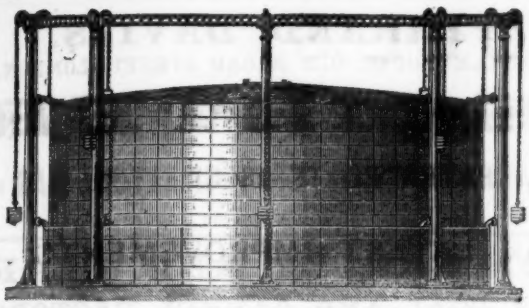

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For Gas, Steam, and Water, Galvanized, Enamelled, or Coated by Dr. Angus Smith's Patent Process.
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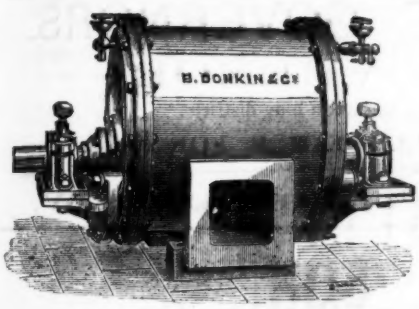

NEW PATENT GAS-EXHAUSTERS.

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Messrs. B. DONKIN & Co. possess the sole right to manufacture these Exhausters.

MADE WITH TWO OUTSIDE BEARINGS AND LATEST IMPROVEMENTS.

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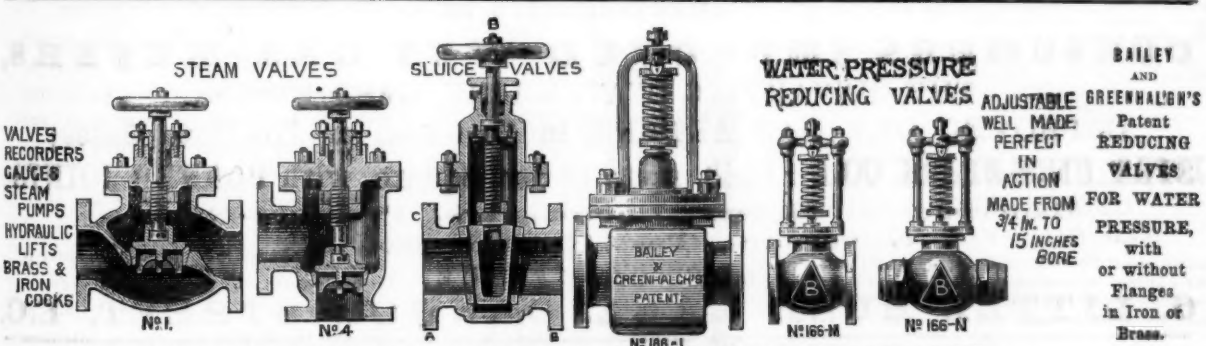

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COMBINING ALL THE LATEST IMPROVEMENTS,

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WET & DRY GAS METERS.
STATION METERS AND GOVERNORS.
JONES'S THROTTLE-VALVE GOVERNORS.
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The simplest and best Instrument extant for checking Excess of Pressure in hilly districts.

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THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges, Governors, Test Holders, &c., &c.

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AUTOMATIC GOVERNOR BURNER.

PRESSURE

FROM GASHOLDER TO BURNER.

The Royal Scottish Society of Arts, in 1876, awarded to D. BRUCE PEEBLES the KEITH MEDAL for his inventions relating to Station and District Governors; and, in 1879, the KEITH MEDAL for his invention of the Needle Gas Governor. The Committee appointed by the Society to examine the merits of the Needle Governor, consisting of the following eminent scientific gentlemen, viz:—Dr. Stevenson Macadam, John Reid, Esq., late of the Edinburgh and Leith Gas-Works, and John Milne, Esq., Milton House, summed up their report by stating, "Your Committee have had the advantage and privilege of experimenting with the Needle Gas Governor, and are convinced that this Governor is the most perfect instrument which has been invented up to this time for controlling the flow of gas."

PEEBLES'S Patent Gas Governors place in the hands of Gas Engineers the means of Controlling Pressure in all situations and circumstances. Safety Station Governors, Metallic Dry District Governors, Metallic Needle Lamp Governors, Consumers Governors, and Domestic Automatic Governor Burners.

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